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LEAVE OR STAY? IMPACT OF CITY ATTRIBUTE PERCEPTION AND CITY IMAGE ON UNIVERSITY STUDENT STAY INTENTION

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ABSTRACT

Urban talent retention, particularly the retention of university graduates within their host cities, has emerged as a critical driver of regional economic and social development. Previous research on whether university students stay in the cities where they went to university has focused more on socioeconomic and demographic factors than on city image and individual perceptions. This paper adopts city image theories to explore how city attribute perception and city image (including cognitive and affective images) affect the stay intentions of university students in both short- and long-term periods. Structural equation modelling shows that both cognitive and affective images are positively associated with the university students' stay intentions. Specifically, cognitive image exhibits a stronger correlation with short-term stay intentions, whereas affective image has a greater association with long-term stay intentions. Regarding city attribute perceptions, cultural quality emerges as the most significant factor in enhancing city image perception and stay intentions, followed by economic development and other attribute perceptions.

Key words: city attribute perceptions; city image; university students; stay intentions; China

INTRODUCTION

City competition has intensified in the knowledge economy era, with human capital emerging as the paramount determinant of urban competitiveness (Rybka-Iwańska & López 2019). University students (including bachelors, masters and PhD students) have full vitality and innovation ability (Sokołowicz 2019), and they are key elements of the city and regional development (Darchen & Tremblay 2010; Rérat 2014; Kotavaara *et al.* 2018). After graduation, they not only bring a lot of local consumption to the cities, but also play an essential role in various fields of city competition as human capital (Abel & Deitz 2011; Higa *et al.* 2019). In addition, concentrated retention of this cohort generates agglomeration effects, attracting further talent inflows through reputational spillovers and network externalities (Rybka-Iwańska & López 2019). Therefore, how to attract and retain talents with a higher education level has become an important issue in city and regional development (Darchen & Tremblay 2010).

Numerous studies have demonstrated and recognised the role of university students in city development. The role of university students as catalysts for urban innovation and economic growth is well-established in scholarly discourse (Rérat 2014; Angelidou 2015; Sokołowicz 2019). However, cities with

universities do not guarantee student retention or optimal post-graduation utilisation (Sokołowicz 2019). Many studies indicate that many graduates do not choose to work in the cities in which they study (Wu 2021). It seems that such flows of highly educated human capital are inevitable (Cairns 2014; Sokołowicz 2019). The flow of university students tends to be from university cities to places with higher perceived utility (Cui *et al.* 2016).

Previous studies identify economic and material factors as essential determinants of university students' migration choices, focusing specifically on factors such as opportunities and salaries (Malamud & Wozniak 2012; Jin *et al.* 2022), quality of life (Cui *et al.* 2016; Sokołowicz 2019), leisure and entertainment facilities (Ahlin *et al.* 2014) and so on. For example, Chinese university students are more inclined to develop in megacities with better working conditions and urban services (Jin *et al.* 2022). In addition, university students' migration is related to their characteristics, including gender (Faggian *et al.* 2007), major (Freeman *et al.* 2012), educational degree (Malamud & Wozniak 2012), race (Farivar *et al.* 2019), living region (Sokołowicz 2019) and hometown economic environment (Cui *et al.* 2016). For example, in the United States, people with advanced degrees are more likely to live in states with higher labour demand and better labour market conditions (Malamud & Wozniak 2012).

While these studies provide an explanation for the migration of university students, especially stressed students' knowledge about the labour market and the social contacts established in their study period influencing their stay or mobile intention (Yousefi & Rives 1987; Bach 2007). However, familiarity with and favourability of the host city also matters in the decision of university students (Chan & Shek 2021). Few studies have covered this aspect in the migration decision-making of university students.

Inspired by the adoption of city image theory to examine residents' participation and satisfaction (Priporas *et al.* 2020), we use city image theory to study individual stay or migrant intentions. City image is people's beliefs and impressions of the city based on some of its attributes, which eventually affect their behavioural intentions (Kotler 1997; Priporas *et al.* 2020). Thus, the city image of individuals is personal perceptions, which can be influenced by previous living experience, future expectations, or personality. While ex-post analyses reveal temporal shifts in students' migration patterns (Kaplan *et al.* 2016; Kotavaara *et al.* 2018), comparative studies of short- versus long-term intentions remain scarce. Integrating this temporal dimension into our model clarifies how time mediates city image's impact on migration mechanisms.

Therefore, to fill these research gaps, this research explores the relationship between city attribute perceptions, city image and short- and long-term migration intentions of university students who have not yet graduated. We conducted a survey in Shenzhen. We selected Shenzhen for this research, as it is a megacity and a special economic zone in China. Bordering Hong Kong to the south, it is one of the core cities in the Greater Bay Area (GBA) (Lu & Ma 2013). It is seen as a global highland in technology, research, advanced manufacturing and financial services in China. As a city welcoming migrants, Shenzhen has a special status in China to attract most university graduates in the GBA, or even China as a whole. Besides, as a city that developed in a short time, the number of university students who have graduated locally is relatively limited compared with other megacities in China. Even as a top migration destination, Shenzhen still has to find strategies to retain its local university students. Thus, this study has strong relevance for other megacities with fierce talent competition.

This paper explores the role of city attribute perceptions and city image on the stay intentions of university students in Shenzhen. Specifically, it has the following contributions. First, it explores university students' impressions of Shenzhen and their stay intentions. Second, it shows how city attribute perceptions affect university students' stay intentions through city image. Third, it discusses the roles of individual demographic factors in city image and stay intentions. Fourth, it compares the differences between the roles of city attribute perceptions and city image on short- and long-term stay intentions.

The remainder of this paper is as follows. Second section reviews the migration, city attribute perceptions and city image theories, and it puts forward hypotheses and a theoretical model. Third section introduces the questionnaire design, data collection process and analysis method. The results of the analysis are in fourth section. Fifth section discusses the results, research limitations and outlook. Sixth section concludes with key findings and policy implications.

LITERATURE REVIEW

University students' migration – Migration theory is fundamental to explain migration or stay behaviour (Carree & Kronenberg 2014). Originating with Ravenstein's (1885) gravity model – which posits that migration flows inversely correlate with geographical distance and proportionally with population size between regions (Higa *et al.* 2019) – the field has expanded to incorporate diverse macro-level perspectives. Other theories also try to explain migration from a macro perspective. For example, neoclassical economic theories suggest that people migrate based on whether or not there is available work in space (Lewis 1954). Dual labour market theory, raised by Piore (1979) stated that migration is caused by a permanent demand for immigrant labour that is inherent to the economic structure of developed nations.

From the micro perspective, theories suggest that individual rational actors decide to migrate because of a cost–benefit calculation. For instance, Yousefi and Rives (1987) applied cost–benefit theory to explore decision-making behaviours by evaluating the costs and benefits of people's mobility, incorporating not only economic and material costs and benefits but also personal factors such as families, friendships and social relations. Push–pull theory further decomposes the explanatory factors of migration behaviour into four parts, including the attractions of the entry place, reasons to leave the departure place, interference factors and personal characteristics (Mazzarol & Soutar 2002; Bach 2007). Based on micro theories, there is a consensus that people weigh personal factors to arrive at the migration decision (Skeldon 1990; Parkins 2010; Jin *et al.* 2022).

Scholarly attention has increasingly focused on university students' migration patterns, recognizing their dual role as both human capital reservoirs and agents of regional economic development (Kotavaara *et al.* 2018). Studies identify four interconnected determinants of graduate mobility: economic incentives (wage premiums and career-entry opportunities), spatial affordability (cost-of-living differentials), urban amenity bundles (cultural infrastructure, recreational options) and kinship obligations (family proximity, caregiving responsibilities) (Malamud & Wozniak 2012; Ahlin *et al.* 2014; Cui *et al.* 2016). University students are often attracted to large metropolitan areas with high wages and a strong labour market, and cultural and recreational amenities may play a further part in college graduate migration decisions (Croft-Piggin 2018).

While extant research predominantly examines university students' immediate post-graduation migration patterns, longitudinal analyses of their long-term mobility trajectories remain scarce, largely due to methodological challenges in tracking mobility data over extended periods. By using the National Longitudinal Survey of Youth from 1979 to 1996 in the United States, Kodrzycki (2001) found university students' long-term mobility is significantly positively correlated with mobility after graduation. Busch (2007) found that personal characteristics are highly related to university student migration by using data from 10 years after graduation in Germany. Based on a retrospective survey of the migration histories of a cohort of UK students between 2001 and 2007, Sage *et al.* (2013) found that parental support is an influential factor for university student migration.

Although these studies have explained migration behaviour from many perspectives, most of them have not considered the role of familiarity and favourability of the host city in migration decision-making. Thus, it is necessary to include city image and city attribute perceptions in the theoretical model of university students' migration decision-making.

Perceptions of city attributes and city image – City attributes have various components in literature. Rainisto (2003) divided city attributes into community service development, city construction and economic development when studying influencing factors of residents' material satisfaction and emotional needs. Noni *et al.* (2014) investigated the effects of city brand building through nine types of city characteristics, such as medical care, education and job opportunities. Although cities own their attributes, individuals may have various perceptions of their attributes (Chan 2019; Carballo *et al.* 2021; Kourtit *et al.* 2021). Compared with objective attributes, the city attribute perceptions in individuals' minds tend to have more influence on their migrant or stay intentions. For instance, Cleave and Arku (2020) found the perception of economic and housing city attributes plays a more important role in immigrant attraction.

City image, conceptualized as the aggregate of residents' beliefs, ideas and impressions of the city (Kotler 1997; Silva *et al.* 2013), exerts a significant influence on migration or settlement decisions. City image focuses on the emotions and cognitions of people, which are not equivalent to the city's objective conditions or the image that city authorities want to create (Lu *et al.* 2017). City image is an essential component of city branding or promotion (Lu & De Jong 2019). Inspired by city destination image theories, city image can be divided into cognitive image and affective image (Baloglu & McCleary 1999; Carballo *et al.* 2021).

Specifically, cognitive image refers to the subject's perception of destination attributes and affective image means the emotional response of individuals to the place (Baloglu & McCleary 1999; Smith 2005). City attribute perceptions, such as the perceptions of economic development and natural environment, can be directly associated with cognitive image as they come from the cognition and perception of the attributes of a place. Although affective image is intangible and immaterial, city attribute perceptions also affect the emotional perception of individuals (Noni *et al.* 2014). In sum, city image is influenced by city attribute perceptions, as cognitive and affective image come from the received information and emotional experience in the city. Crucially, both dimensions represent subjective interpretations that may diverge significantly despite objective urban similarities. Thus, to study how these city attribute perceptions affect city image, we put forward the following hypotheses:

H1 Perceptions of city attributes are positively associated with the cognitive component of city image (five attributes split into five sub-hypotheses: H1.1–1.5).

H2 Perceptions of city attributes are positively associated with the affective component of city image (five attributes split into five sub-hypotheses: H2.1–2.5).

City image and migration intention – City image (including cognitive and affective images) reflects city identity, affecting people's migration or stay decisions (Baloglu & McCleary 1999; Stylidis *et al.* 2017). Studies have shown that a positive image can increase the city's attraction (Grosspietsch 2006). Some scholars also found that city image can influence the intention to stay or leave a place (Zenker *et al.* 2013). Cognitive image encompasses individuals' systematic evaluation and factual understanding of a place's objective attributes (Binh & Bagul 2020). Affective images capture individuals' subjective emotional responses to spatial characteristics, encompassing feelings ranging from pleasure and contentment to anxiety (Woosnam *et al.* 2020).

Scholarly inquiry into place perception initially prioritised cognitive dimensions in explaining migration behaviour, with affective dimensions receiving limited attention in pioneering research (Martin & Bosque 2008). Recently, more scholars agree that the coexistence of these cognitive and emotional components can better explain the image of a place (Yuksel *et al.* 2010; Stylidis *et al.* 2017). For instance, Gunko and Medvedev (2018) showed that affective image has more influence when interpreting migration intentions of youth from small cities.

The effect of images on behavioural intention is also time sensitive. In destination image theory, behavioural intention represents the probability of repetitive visit behaviours and may predict visitors' loyalty (Xie & Lee 2013). These intentions also exhibit temporal decay, so behavioural loyalty measurement often requires specific time points (Yu & Ding 2013). The retention rates among graduates in the university's location cities decrease after graduation (Busch & Weigert 2010). This decreasing trend wanes gradually, as cumulative migration costs escalate (Lai *et al.* 2021).

Regarding the definition of short- and long-term migration (or stay) intentions, Tan *et al.* (2017) and Liu *et al.* (2018) referred to the China Migrant Dynamic Survey of the National Health Commission of China and delineated the boundary between long- and short-term settlement intentions of the floating population as 5 years. Thus, the long-term is also defined as 5 or more years and the short-term is less than 5 years in this study. Five years or more also matters to university students, as they may lose the willingness to migrate after 5 years of graduation experience (Kaplan *et al.* 2016):

H3a Cognitive image is positively associated with university students' short-term stay intentions in Shenzhen.

H3b Cognitive image is positively associated with university students' long-term stay intentions in Shenzhen.

H4a Affective image is positively associated with university students' short-term stay intentions in Shenzhen.

H4b Affective image is positively associated with university students' long-term stay intentions in Shenzhen.

In addition, as the demographic factors also have an impact on the choice of students' migration, this study incorporates three student-specific control variables operationalized through, including educational level (Cui *et al.* 2016), hometown location (Cui *et al.* 2016) and study disciplines (Freeman *et al.* 2012). Accordingly, we put forward the following hypothesis (see Figure 1).

RESEARCH DESIGN AND METHOD

Data collection – The sample in this research was university students in Shenzhen, including undergraduates, master students and doctoral students. We used the non-probabilistic snowball sampling technique by inviting researchers from major universities in Shenzhen to help distribute questionnaires among their students. Eleven universities in Shenzhen are included in this research, mainly including Shenzhen University, Southern University of Science and Technology, Harbin Institute of Technology (Shenzhen), etc. Due to the impact of COVID-19, students were invited to complete the questionnaire on the online questionnaire platform. The questionnaire was available from January to March 2022 and more than 800 questionnaires were collected. However, we deleted unqualified questionnaires (including questionnaires completed too quickly, those with contradictory contents, etc.), and we retained 515 valid questionnaires.

The proportions of undergraduate, master's and doctoral students in the sample were 52.04%, 34.76% and 13.2%, respectively. Regarding age, 3.3% were 18 and below, 49.32% between 19 and 22, 35.35% between 23 and 26, 10.10% between 27 and 30 and 1.75% 31 and over. The proportion of university students with various educational levels and ages in the sample is similar to the general student population of Shenzhen (SMBE, 2021). The male-to-female ratio was close to the national average, as no data on the male-to-female ratio of university students in Shenzhen were available (Li 2016). Overall, the sample of this study represents university students in Shenzhen to some extent (Appendix A shows the structure of the respondents and part of the overall structure).

Questionnaire design – To measure city attribute perceptions, we mainly referred to the research of Cleave and Arku (2020) and Noni *et al.* (2014). Based on previous research

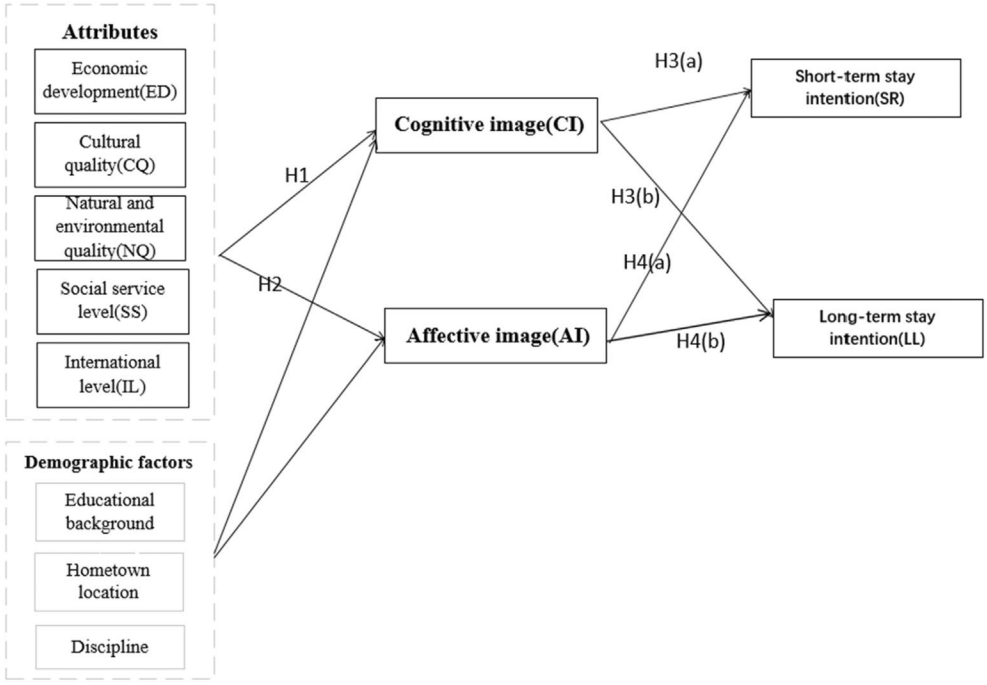

Figure 1. *Simplified research model and hypotheses.*

and the characteristics of Shenzhen, this study put forward five types of city attributes most widely adopted, namely, economic development (Cleave & Arku 2020; Jiang *et al.* 2020), cultural quality (Kourtit *et al.* 2021), natural and environmental quality (Fan *et al.* 2017; Carballo *et al.* 2021), social service level (Zhao 2021) and international level (Noni *et al.* 2014; Cleave & Arku 2020). The definition and measure items of city attribute perceptions can be found in Table 1A.

The measurement of city images followed the research of Silva *et al.* (2013) and Carballo *et al.* (2021). Combined with the characteristics of Shenzhen and the above literature, we divided the cognitive image of Shenzhen into two main dimensions (five facts in total): life and development, including life quality, the convenience of life, colourful life, personal development and city with sustainable development vitality (see Table 1B). Following Silva *et al.* (2013) and Meng *et al.* (2021)'s research, affective images divided into positive and negative parts. We adopted five items to measure affective image using a set of positive and negative words, including unpleasant or pleasant, gloomy or exciting, sleepy or vibrant, unimportant or important and bored or attached (see Table 1B).

Following Tan *et al.* (2017) and Liu *et al.* (2018), we divided the stay intentions in Shenzhen into short-term (SR) and long-term (LL), with three similar statements with a few semantic distinctions (see Table 1C). All multi-item scales besides affective image cognition were measured by 7-point Likert-type scales (ranging from 1 = strongly disagree to 7 = strongly agree). The items for affective image were measured on a 7-point semantic differential scale (larger numbers represent more positive emotions and lower numbers represent more negative emotions).

Analytical method – We used structural equation modelling (SEM) to test our model for many reasons. First, it allows simultaneous estimation of models with multiple independent and dependent variables. Furthermore, it enables the estimation of potential (unobserved) changes from observed variables, taking into

Table 1A. *The measurement items of city attribute perceptions and image and stay intentions. City attribute perceptions.*

Attributes	Definition	Items
Economic Development (ED)	Referring to overall urban economic growth level, also considering employment opportunities and the number of high-tech enterprises (Cleave & Arku 2020; Jiang *et al.* 2020)	Overall level (ED1) Work opportunities (ED2) High-tech enterprises (ED3)
Cultural Quality (CQ)	Referring to perceived cultural diversity in the city and the availability of related cultural activities and facilities (Noni *et al.* 2014; Cleave & Arku 2020; Kourtit *et al.* 2021)	Cultural resources (CQ1)[a] Cultural facilities (CQ2)[b] Cultural activities (CQ3)[c]
Natural and environmental Quality (NQ)	The natural environment that cities can provide for life and activities (Fan *et al.* 2017; Cleave & Arku 2020; Carballo *et al.* 2021)	Air (NQ1) Water (NQ2) Climate (NQ3) Green space (NQ4)
Social Service level (SS)	Various public services and guarantees provided by the city (Noni *et al.* 2014; Kourtit *et al.* 2021; Zhao 2021)	Guarantees for vulnerable groups (SS1) Security and welfare (SS2) Equal rights (SS3) Public infrastructure (SS4)
International level (IL)	The city's international influence and level of communication (Noni *et al.* 2014; Jiang *et al.* 2020)	International transportation (IL1) International conferences (IL2) Foreign investment (IL3)

[a]*Cultural resources refer to whether the cultural richness of the city enables each group in the city to find its own form of value expression (Noni et al. 2014; Cleave & Arku 2020).*
[b]*Access to cultural facilities is to measure the opportunities for residents to enjoy cultural facilities during their time, including the number, location and accessibility of cultural facilities (Fan et al. 2017; Cleave & Arku 2020; Carballo et al. 2021).*
[c]*Cultural activities is a kind of cultural form involving art, knowledge, belief, custom and other cultural phenomena held in the city, and it is a kind of creation and communication in various forms to meet the spiritual needs of residents (Noni et al., 2014).*

Table 1B. *The measurement items of city attribute perceptions and image and stay intentions. City image.*

Image	Definition	Items
Cognitive image (CI)	Perception of the materiality of a place (Silva *et al.* 2013; Carballo *et al.* 2021; Meng *et al.* 2021)	Life Quality (CI1) The convenience of life (CI2) Colourful life (CI3) Personal development (CI4) City development (CI5)
Affective image (AI)	Emotional awareness of a place (Silva *et al.* 2013; Carballo *et al.* 2021; Meng *et al.* 2021)	Unpleasant/ pleasant (AI1) Gloomy/ exciting (AI2) Sleepy/ vibrant (AI3) Unimportant/ important (AA4) Bored/attached (AA5)

account measurement errors of variables. More importantly, SEM supports the examination of mediation effects (Kline 2015).

To test the reliability and validity of the model, we used confirmatory factor analysis (Noni *et al.* 2014). The validity of the model relies on

Table 1C. *The measurement items of city attribute perceptions and image and stay intentions. Stay intentions.*

Intentions	Definition	Items
Short-term stay intentions (SR)	Take 5 years as the dividing line between long and short term, and use three semantically similar words to evaluate intentions comprehensively (Kaplan *et al.* 2016; Tan *et al.* 2017; Kotavaara *et al.* 2018; Liu *et al.* 2018; Lin & Zhu 2022)	Plan to stay (5 years and less, same below) (SR1) Decide to stay (SR2) Want to stay (SR3)
Long-term stay intentions (LL)		Plan to stay (more than 5 years, same below) (LL1) Decide to stay (LL2) Want to stay (LL3)

Short-term stay intentions do not include continuing to study in Shenzhen.

Table 2A. *Results of short- and long-term models using SEM. Standardized direct effects of city attribute perceptions and city image.*

Model	Hypothesis	Path	Std. Estimate	P-values	Result
Short-term model	H1.1	ED → CI	0.317	0.001	Accepted
	H2.1	ED → A1	0.231	0.015	Accepted
	H1.2	CQ → CI	0.334	0.001	Accepted
	H2.2	CQ → A1	0.273	0.001	Accepted
	H1.3	NQ → CI	0.142	0.057	Accepted
	H2.3	NQ → A1	0.156	0.057	Accepted
	H1.4	SS → CI	0.144	0.084	Accepted
	H2.4	SS → A1	0.173	0.038	Accepted
	H1.5	IL → CI	0.163	0.059	Accepted
	H2.5	IL → A1	−0.029	**0.720**	**Rejected**
	H3(a)	CI → SR	0.369	0.001	Accepted
	H4(a)	A1 → SR	0.212	0.001	Accepted
Long-term model	H1.1	ED → CI	0.310	0.007	Accepted
	H2.1	ED → A1	0.227	0.036	Accepted
	H1.2	CQ → CI	0.332	0.007	Accepted
	H2.2	CQ → A1	0.273	0.007	Accepted
	H1.3	NQ → CI	0.144	0.047	Accepted
	H2.3	NQ → A1	0.158	0.041	Accepted
	H1.4	SS → CI	0.150	0.092	Accepted
	H2.4	SS → A1	0.175	0.064	Accepted
	H1.5	IL → CI	0.164	0.046	Accepted
	H2.5	IL → A1	−0.028	**0.741**	**Rejected**
	H3(b)	CI → LL	0.336	0.007	Accepted
	H4(b)	A1 → LL	0.225	0.007	Accepted

1. **Bold** *font = non-significant.*
2. Model fit indices in short-term model: CMIN/DF = 3.450, CFI = 0.838, TLI = 0.806, RMSEA = 0.069, indicating an adequate model fit.
3. Model fit indices in long-term model: CMIN/DF = 3.492, CFI = 0.835, TLI = 0.803, RMSEA = 0.070, indicating an adequate model fit.

convergent validity and discriminant validity. The results in Appendix B show that the measurement model has adequate reliability and validity. In addition, the models also have good model fits (see the notes for Table 2A). In this study, we used the maximum likelihood method

because the data were normally distributed. However, since indirect effects are usually non-normally distributed, we also used the bootstrap technique to test the significance of indirect and total effects (Efron & Tibshirani 1994).

RESULTS

University students' impressions of Shenzhen – In addition to the above variables and demographic information, the questionnaire also collected words university students used to describe Shenzhen. The frequency of words was sorted into a word cloud (see Figure 2), which can more intuitively illustrate the basic impressions of Shenzhen among university students. The top five words university students use to describe Shenzhen are in Appendix B, namely innovation, energetic, reform, high-tech and open. Considering university students' disciplines, it is found students from social and humanities also recognise the inclusiveness of Shenzhen. The reason can be that Shenzhen is a city with a high proportion of migrants, whose culture is relatively friendly to migrants with different backgrounds. The inclusiveness of Shenzhen is more recognisable for university students with social and humanity backgrounds.

This measurement of city attribute perceptions, city images and stay intentions is shown in Appendix C, where the mean of each measurement item is greater than four on the 7-point Likert-type scale. The stay intentions of university students in Shenzhen are also positive. Still, the stay intentions in the short-term model are larger than those in the long-term model (5.26/7 and 4.27/7, respectively).

Factors determining stay intentions – Table 2 summarizes the results of factors influencing stay intentions in the short- and long-term models. The results, as shown in Table 2A, indicate that all attributes except international level have significantly enhanced cognitive and affective image in both short- and long-term models. Somewhat counterintuitively, it is cultural quality perception rather than economic development perception that has the strongest positive association with both cognitive and affective image. Notably, international level perception only has a

Figure 2. *Word cloud of key words of university students describing Shenzhen.*

Table 2B. *Results of short- and long-term models using SEM. (B) Standardized indirect (total) effects of city attribute perceptions.*

City attribute perceptions	Short-term stay intention	Long-term stay intention
Economic development (ED)	0.166***	0.155***
Cultural quality (CQ)	0.181***	0.173***
Natural and environmental quality (NQ)	0.085**	0.084**
Social service level (SS)	0.90**	0.90**
International level (IL)	0.054	0.049

Significance levels: ***$p<0.01$; **$p<0.05$; *$p<0.1$.

significant positive association with cognitive image in the short- and long-term, but not with affective image. In addition, both cognitive and affective image have a significant positive correlation with stay intentions in both models. The results of the hypotheses are in Table 2A.

As Table 2B shows, among the city attribute perceptions, economic development, cultural quality, social service level and natural and environmental quality perceptions are significantly and positively associated with the short- and long-term intentions in Shenzhen, whereas international level perception demonstrates a nonsignificant association. Among these factors, cultural quality perception exerts the substantial influence, followed by economic development, social service level and natural and environmental quality perceptions. In addition, all attribute perceptions exhibit a larger correlation with short-term stay intentions compared to long-term intentions. This suggests that university students may prioritise additional factors, such as marriage status or children, when making long-term decisions, potentially diminishing the relative importance of city attribute perceptions in the decision-making process.

In Table 2B, for the overall model, economic development, cultural quality, natural and environmental quality and social service level perceptions demonstrate significant correlations with stay intentions, mediated by their influence on city image. In contrast, the international level perception shows no significant effects. Specifically, economic development and cultural quality perceptions exhibit a more considerable correlation with cognitive image than with affective image. Conversely, natural and environmental quality perception, as well as social service level perception has a more pronounced association with affective image than with cognitive image.

The R^2 values for cognitive image, affective image and stay intentions in Shenzhen are 0.718, 0.414 and 0.262, respectively, in the short-term model and 0.720, 0.414 and 0.242, respectively, in the long-term model. The R^2 values for cognitive image in both models are substantially higher than those for affective image, indicating that city attribute perceptions have a greater explanatory power for cognitive image. Furthermore, cognitive image demonstrates a stronger association with stay intentions in Shenzhen than affective image in both models, suggesting that cognitive image plays a more influential role in shaping stay intentions.

A comparison of the two models reveals that the explanatory power for stay intentions is higher in the short-term than in the long-term model. Notably, cognitive image exhibits a stronger positive association with stay intentions in the short-term model, whereas affective image shows a greater association with stay intentions in the long-term model. This highlights the distinct roles of cognitive and affective images in shaping long-term and short-term stay intentions.

As Table 2C shows, there is no significant relationship between students' discipline, city image and stay intentions. However, compared to undergraduate students, graduate students (including master and doctoral students) tend to hold more negative perceptions of cognitive image, although this does

Table 2C. *Results of short- and long-term models using SEM. Standardised effects of demographic factors on city image and stay intentions.*

Model	Demographic factors		City image/stay intentions	Direct	Indirect
Short-term model	Education level (ref. Undergraduate)	Graduates	CI	−0.117***	–
			AI	0.033	–
	Hometown (ref. Shenzhen City)	Outside Guangdong Province	CI	−0.093*	–
			A1	−0.140**	–
		Guangdong Province (except for Shenzhen)	CI	−0.071	–
			A1	−0.083	–
	Discipline (ref. Social and Humanities)	Science and Engineering	CI	−0.031	–
			A1	−0.003	–
	Education level	Graduates	SR	–	−0.036
	Hometown	Outside Guangdong Province	SR	–	−0.064**
		Guangdong Province (except for Shenzhen)	SR	–	−0.044
	Discipline	Science and Engineering	SR	–	−0.012
Long-term model	Education level (ref. Undergraduate)	Graduates	CI	−0.121***	–
			AI	0.032	–
	Hometown (ref. Shenzhen City)	Outside Guangdong Province	CI	−0.101*	–
			A1	−0.144**	–
		Guangdong Province (except for Shenzhen)	CI	−0.078	–
			A1	−0.086	–
	Discipline (ref. Social and Humanities)	Science and Engineering	CI	−0.035	–
		Outside Guangdong Province	A1	−0.005	–
	Education level	Graduates	LL	–	−0.033
	Hometown	Outside Guangdong Province	LL	–	−0.066**
		Guangdong Province (except for Shenzhen)	LL	–	−0.045
	Discipline	Science and Engineering	LL	–	−0.013

Significance levels: ***$p<0.01$; **$p<0.05$; *$p<0.1$.

not significantly correlate with their stay intentions through city image. Additionally, students from outside Guangdong Province report lower city image perception and stay intentions in Shenzhen compared to students from Shenzhen itself.

DISCUSSION

The unique city image of Shenzhen – Generally speaking, university students in Shenzhen have a good impression of the city. They have positive attitudes towards the city attribute perceptions, cognitive image and affective image of Shenzhen, and their stay intentions in Shenzhen in the short- and long-term are also high (the above measures are greater than four on a 7-point scale). These results are consistent with previous findings that Chinese university students tend to stay in megacities (Yang *et al.* 2011). This tendency can also be explained by the correlations of city attribute perceptions on the image of megacities. As economic development is still one of the main influential factors of city image and stay intentions, megacities with suitable economic environments and employment opportunities tend to attract graduates (Lai *et al.* 2021; Sokołowicz, 2019).

The role of city attribute perceptions – City attributes must satisfy a number of different stakeholders' interests. This study focuses on the

relationship among city attribute perceptions, city image and stay intentions of university students, who are an important subgroup of high-quality human capital for a city.

Notably, the correlation of cultural quality perception with city image and stay intentions in this study slightly exceeds that of economic development. Cultural openness, diversity and supply of cultural products have increasingly become the key attributes for cities to attract external populations, especially high-quality talent (Rybka-Iwańska & López 2019). The culture and customs perceived by migrants in Shenzhen do matter to them. Shenzhen, a major metropolis in China, has sustained a high level of economic development for an extended period. Consequently, economic development is no longer the primary factor influencing students' decisions to remain in the city. Instead, given Shenzhen's relatively brief history of 45 years as of 2024, students are increasingly prioritising its cultural quality attributes, including cultural facilities and activities. The fulfilment of students' cultural needs now plays a more significant role in their intentions to stay in the city.

Additionally, following cultural quality and economic development perceptions, social service level perception has a significantly positive association with cognitive image, affective image and stay intentions. Social service level is related to university students' life quality, spiritual experience and emotional experience, similar to the findings of the perception of residents on city image of Milan (Noni *et al.* 2014) and Lodz in Europe (Sokołowicz 2019). Natural and environmental quality perception also shows a significant association with city image and stay intentions in this study, and previous studies have shown that the natural environment directly affects the workplace choices of university graduates (Lai *et al.* 2021).

The association of international level perception with cognitive image is also nonsignificant. Noni *et al.* (2014) found that the international level has a positive and significant impact on the image and talent attraction of Milan. However, the respondents in their study were residents from various backgrounds, and international level mattered to their attitudes towards Milan. Compared with Milan's respondents, university students in Shenzhen have not cared much about Shenzhen's international level yet.

Comparing the relationship between cities attribute perception, cognitive and affective images, the correlation of most attributes with cognitive image was generally larger than that on affective image. Besides, the model also has a stronger explanatory power for cognitive image. This result is consistent with a previous study in Cáceres, Spain (Hernández-Mogollón *et al.* 2018). Besides, regarding the association of city attribute perceptions with short-and long-term stay intentions, all attributes have larger coefficients in the short-term stay intentions model than the long-term one. It indicates city attribute perceptions play a more important role in short-term stay intentions than the long-term ones.

Role of cognitive and affective city images – In this study, it is found that cognitive and affective city image play an important role in university students' short and long-term stay intentions. Specially, cognitive image has a stronger positive association with short-term stay intentions, while affective image has a more substantial correlation with long-term stay intentions. This may be because, in addition to the material benefits that need to be considered for short-term stay, when considering long-term stay, it is necessary to pay more attention to factors that are more inclined to emotional experiences, such as social connection, sense of belonging, cultural identity, etc. (Rérat 2014; Sokołowicz, 2018; Yigitcanlar *et al.* 2007). Hence, cities aiming for sustained success in attracting and retaining top talent must prioritise cultivating an emotional appeal that resonates with skilled professionals. When considering demographic factors, we find that although education level plays a role in cognitive image, it has no significant association with the final intentions of staying in Shenzhen, which is similar to the previous research conclusion of Cui *et al.* (2016) in Nanjing. The city image and stay intentions of students whose hometown is outside Guangdong Province are significantly lower, which indicates that students still tend to return to relatively familiar places after graduation

(Venhorst 2013). This bifurcation suggests policymakers must develop origin-specific strategies, reinforcing cultural assimilation for external talents while leveraging pre-existing spatial bonds for local graduates.

Research limitations – There are still some limitations in this study. Due to time limitation, it was difficult to increase the sample of university students in data collection, which restricted the number of variables in the model. As this research only investigated the stay intentions of university students, future research could also conduct follow-up surveys to track real migration choices and to compare students' actual and intentional choices. Additionally, the long-term stay intentions of students can be difficult to capture due to university students' limited forward-looking perceptions. Regarding future research, scholars could expand the research area and explore university students' migration (or stay) behaviour in other areas, as well as the phenomenon of mutual migration between different cities and regions. In addition, due to the limitations of collecting questionnaires, the questionnaire used in this paper is cross-sectional data. Compared to panel data, regression analysis may generate correlations without causality. In the future, further research can track and collect panel data from survey subjects to increase the generalisation of the results. Finally, housing or other costs of living attributes are also important attributes influencing city images of university students. Future research can study the impact of housing price and living costs on university students' stay intentions.

CONCLUSION

Key finding – This paper explores the relationship of city attribute perceptions, city image and the stay intentions of university students in Shenzhen. It uses city attribute and image theories to explore how city attribute perceptions affect cognitive and affective image. It further explores how city attribute perceptions and city image affect their stay intentions in Shenzhen in the short- and long-term. In addition, the relationship among demographic factors, city image and stay intentions is also discussed. This study contributes to migration research by introducing city attributes and image theories to explain migration (or stay) intentions, and it also pays special attention to the university student group.

Regarding the association of city attribute perceptions on city image and stay intentions, the positive role of cultural quality perception exceeds that of economic development perception, reflecting that cultural development has become essential in attracting university students. The association of social service level perception on city image and stay intentions is also significantly positive. The international level and natural and environmental quality perception have a nonsignificant correlation with the stay intentions. Affective image has a larger correlation with long-term stay intentions than cognitive image. The study also found that compared with students from Guangdong province, students from other provinces are less inclined to stay in Shenzhen.

This paper makes the following theoretical contributions. First, regarding the association of city image with migration or stay intentions, previous studies did not account for the correlation of city image with migration or stay intentions (Martin & Bosque 2008; Mazzarol & Soutar 2002; Yousefi & Rives 1987). This research explores the relationship among city attribute perceptions, cognitive and affective image, and migration intention. Second, this research has distinguished short- and long-term stay intentions, which explain the different contributions of city attribute perceptions and city images to short- and long-term stay intentions. Third, this research has paid particular attention to the demographic factors of university students in their short- and long-term stay intentions.

Policy implications – Regarding policy implications, this study specifically examined the case of Shenzhen, China, and the findings concerning the association between city attribute perceptions, city image and stay intentions of university students can be extended to other megacities. At a general level, the

development of city attributes requires current status quo analysis and depends on the specific stakeholder targeted. The study demonstrates that the correlation of city attribute perceptions on city image and stay intentions can vary across different groups. For example, it is plausible to assume that university students are primarily attracted by economic development. However, in megacities with higher economic performance, university students are more concerned with other city attributes, such as cultural quality. Therefore, policymakers should prioritise not only economic development but also talents' perceptions of other city attributes, such as cultural quality, social service levels and the natural environment. Lastly, the association of city attribute perceptions with students' intentions to stay in Shenzhen can also be strengthened by city brand construction. Proper city branding can convey city advantages to student groups, improve their evaluation of city attributes and eventually enhance their stay intentions in Shenzhen.

Second, as the association of affective image with stay intentions is larger in the long-term model, urging policymakers to prioritise emotional engagement for university students. Additionally, city promotion in other provinces is also important for cities, which improves the familiarity of students from other provinces to Shenzhen. It is also worth noting that stay intentions in the long term are significantly lower than stay intentions in the short term, which is also worthy of the government's attention.

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CONFLICT OF INTEREST

None.

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APPENDIX A

Sample profile (n=515)

Demographic characteristics	Frequency	Share of samples	Share of all students in Shenzhen
Gender			
Male	254	49.32%	
Female	261	50.68%	
Age			
18 years and below	17	3.30%	
19–22 years	254	49.32%	
23–26 years	183	35.53%	
27–30 years	52	10.10%	
31 years and over	9	1.75%	
Discipline[a]			
Science and Engineering	302	58.64%	
Social and Humanities	213	41.36%	
Educational[b] level			
Undergraduate	268	52.04%	60.25%
Master student	179	34.76%	33.07%
Doctoral student	68	13.20%	6.68%
Hometown location (native place)			
Shenzhen City	58	11.26%	
Guangdong Province (except for Shenzhen)	128	24.85%	
Outside Guangdong Province	329	63.88%	
Time to graduation			
Within 1 year	199	38.64%	
Within 2–3 years	254	49.32%	
More than 3 years	62	12.04%	

[a]*For the division of disciplines, refer to the catalogue of disciplines and majors issued by the Ministry of Education (Ministry of Education of the People's Republic of China 2012).*

[b]*The real share of all students is not exactly due to the lag in data release and the authenticity of the data. The data referenced in this study comes from the Shenzhen Education Yearbook (2020) and the data published on the official websites of various universities in Shenzhen (Shenzhen Municipal Bureau of Education 2021).*

APPENDIX B

The top 5 words used by students to describe Shenzhen

All sample (515)			Discipline	
Words	Frequency	Share of sample	Science and Engineering (302)	Social and Humanities (213)
Innovation	343	66.60%	Innovation (194)	Innovation (149)
Energetic	258	50.10%	Energetic (159)	Energetic (99)
Reform	216	41.94%	High-tech (137)	Reform (89)
High-tech	216	41.94%	Reform (127)	High-tech (79)
Open	186	36.12%	Open (110)	Inclusiveness (77)

The numbers in brackets indicate the frequency of the word, and each student can choose three to four words to describe Shenzhen.

APPENDIX C

Results of the Confirmatory factor analysis

(A) Convergent validity and reliability measures

Latent variable	Measurement items	Mean	Stand factor loadings	CR	AVE	Cronbach's alpha
Economic development (ED)	ED1	5.91	0.700***	0.77	0.528	0.765
	ED2	5.99	0.702***			
	ED3	5.94	0.776***			
Cultural quality (CQ)	CQ1	4.44	0.674***	0.85	0.656	0.835
	CQ2	5.16	0.862***			
	CQ3	5.05	0.878***			
Natural and environmental quality (NQ)	NQ1	5.97	0.724***	0.772	0.460	0.761
	NQ2	5.57	0.726***			
	NQ3	5.57	0.611***			
	NQ4	5.87	0.643***			
Social service level (SS)	SS1	5.42	0.802***	0.857	0.602	0.833
	SS2	5.28	0.894***			
	SS3	5.09	0.709***			
	SS4	5.41	0.680***			
International level (IL)	IL1	5.83	0.680***	0.771	0.529	0.762
	IL2	5.62	0.786***			
	IL3	5.83	0.712***			
Cognitive image (CI)	CI1	4.86	0.678***	0.847	0.526	0.836
	CI2	5.66	0.780***			
	CI3	5.15	0.719***			
	CI4	5.63	0.774***			
	CI5	5.78	0.668***			
Affective image (AI)	AI1	5.05	0.880***	0.871	0.580	0.870
	AI2	4.92	0.837***			
	AI3	5.08	0.790***			
	AI4	5.11	0.596***			
	AI5	4.53	0.666***			
SR (live in Shenzhen for a short time (SR))	SR1	5.35	0.929***	0.959	0.887	0.959
	SR2	5.25	0.969***			
	SR3	5.17	0.927***			
LL (live in Shenzhen for a long time (LL))	LL1	4.37	0.954***	0.970	0.916	0.970
	LL2	4.3	0.986***			
	LL3	4.15	0.931***			

1. The two models only have 'SR' and 'LL' variables and their observation variables replaced each.
2. The overall Cronbach's alpha of the short-term model is 0.932, while the long-term model is 0.928.
3. Significance levels: ***$p<0.001$; **$p<0.01$; *$p<0.05$.

(B) Latent variables correlation matrix in short-term model

Variables	AI	SR	CI	IL	SS	NQ	CQ	ED
AI	**0.762**							
SR	0.446	**0.942**						
CI	0.716	0.533	**0.725**					
IL	0.344	0.161	0.633	**0.727**				
SS	0.506	0.305	0.675	0.546	**0.776**			
NQ	0.381	0.173	0.458	0.329	0.427	**0.678**		
CQ	0.470	0.416	0.636	0.400	0.519	0.276	**0.810**	
ED	0.455	0.247	0.672	0.546	0.583	0.450	0.389	**0.727**

1. Values below the diagonal are correlation estimates among constructs; diagonal elements (in bold) are square roots of the AVE value.
2. The adequate discriminant validity requires that the square root of AVE for each construct be greater than its correlation coefficients with the other constructs (Fornell & Larcker 1981).

(C) Latent variables correlation matrix in long-term model

Variables	AI	SR	CI	IL	SS	NQ	CQ	ED
AI	**0.761**							
SR	0.438	**0.957**						
CI	0.717	0.504	**0.719**					
IL	0.344	0.141	0.633	**0.726**				
SS	0.506	0.301	0.677	0.546	**0.776**			
NQ	0.381	0.157	0.456	0.329	0.426	**0.678**		
CQ	0.470	0.387	0.638	0.400	0.518	0.275	**0.810**	
ED	0.455	0.203	0.669	0.546	0.583	0.450	0.389	**0.721**