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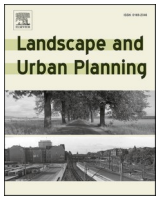

Comparison of urban green space usage and preferences: A case study approach of China and the UK

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HIGHLIGHTS

- Despite the need to understand UGS preference across countries, few comparative studies exist.
- Perceived accessibility is the main factor positively affecting the enjoyment of visiting parks on foot.
- In the UK and China, for frequent park users, visit duration decreases with increasing visit frequency.
- Unlike in China, enjoying scenery motivates more older individuals' visiting parks in the UK.

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ABSTRACT

The literature identifies an important research gap regarding the variability in people's needs and preferences for Urban Green Space (UGS) depending on sociodemographic and cultural backgrounds. Therefore, it is essential to understand the impact of these differences on UGS utilization preferences. However, there remains a lack of a comprehensive comparative research on this topic. This study compared the analysis of park usage and preferences from urban parks accessed on foot by analyzing and comparing the results of 2,360 online questionnaires from Guangzhou (China) with 7,159 responses from London (UK) using the Monitoring of Natural Environment Engagement (MENE) survey data. The results highlighted the importance of knowing which park usage and preferences were more likely to exhibit large variations/similarities based on different socio-demographic and cultural backgrounds. For example, one difference was in the UK older people were more likely to spend less time in parks, while in Guangzhou duration increased up to the age of 50 years before declining. One similarity indicated that park users in both countries tended to spend longer times in parks if they walked longer times accessing these parks. These findings have implications for distinguishing international planning and designing principles in various social cultural contexts.

1. Introduction

Urban green space (UGS) is a critical resource for both nature and humans and therefore serves aspects of both ecology and wider society (Chiesura, 2004; Ghimire, Ferreira, Green, Poudyal, Cordell & Thapa, 2017). The benefits derived from UGS depends on how efficiently it is used by people (Dunton, Almanza, Jerrett, Wolch & Pentz, 2014). Previous studies have investigated the relationship between the frequency of use / motivation to visit and the characteristics of UGS with the goal of maximising the human benefits of UGS through informed planning, design and management (Liu, Wang, Grekousis, Liu, Yuan & Li, 2019). Several existing studies have highlighted the variability in: UGS use characteristics including frequency and visit duration (Wen, Zhang, Harris, Holt & Croft, 2013); motivation for visiting; and the importance attached to specific park features (Dobbinson, Simmons, Chamberlain, MacInnis, Salmon, Staiger, … Veitch, 2020; Shan, 2014a).

Literature reviews on the preferences of different groups of people for accessing UGSs (Rigolon, 2016; Ordóñez-Barona, 2017) have listed the varying influences that the demographic characteristics of users bring to bear on the habits of use, motivations for accessing green spaces, etc., in accordance with the various socio-cultural contexts studied, such as different cities, countries, and so on.

The variability in the use of UGSs in different socio-cultural contexts highlighted by existing studies (Kaplan & Herbert, 1987; Özgüner,

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2011), demonstrates the need for further inquiry in order to facilitate the detailed design and planning of UGSs in culturally diverse contexts tailored to different populations. Given the increasing prevalence of multicultural cities across the globe (in terms of nationality, ethnicity, language, gender, and age) which has been exacerbated by recent global migration trends (Vertovec, 2011), further research into the impact of different sociocultural contexts on people's preferences for and use of UGS is required. The key point is that whilst previous studies have explored use and preference of UGSs by different population groups (such as socioeconomic status, age, gender and education levels) and also different cultures (nationality and ethnicity for example), to date, there has been a lack of research that explored UGS for different groups within difference social-cultural backgrounds (Guan, Wang, Van Berkel & Liang, 2023). The two systematic literature reviews that have explored variations in UGS usage and preference (Rigolon, 2016; Ordóñez-Barona, 2017) only compared and contrasted findings but did not undertake statistical analysis to explore similarities and differences.

This study sought to address this research gap by comparing park use in two culturally diverse global cities: Guangzhou (China) and London (UK). The analysis used data from two questionnaire surveys conducted in each city to explore five use characteristics of parks (visiting frequency, visit duration, motivation for visitation, ease of access, and enjoyment of visit) by visitor groups (distinguished by age and gender). This study had two main goals: (1) to explore the extent to which people have differences in use and preference for parks due to age, gender and education contexts and (2) to explore how any differences may vary in different cultural contexts – by comparing the UK and China.

2. Background

In recent years, with the growth of the world's population living in urban areas, there has been increasing scholarly interest in the provision of UGS (Zhou & Wang, 2011; Gradinaru, Onose, Oliveria, Slave, Popa & Gravrilidis, 2023). Defining UGS can be problematic and varies within national contexts (Taylor & Hochuli, 2017). UGSs are generally defined as publicly accessible open spaces with a high vegetation cover (e.g., parks, woodlands, natural areas and other green spaces) (Schipperijn, Stigsdotter, Randrup & Troelsen, 2010), and can also include blue spaces such as rivers and canals, collectively known as blue-green zones (De Haas, Hassink & Stuiver, 2021). Given continued urbanisation, there is an increasingly important role for UGS strategies around the world to be continually redesigned in order to move towards sustainable development (Guan et al., 2023; Lahtinen, Salonen & Toivonen, 2013) and equity in UGS provision (Areola, 2022). For example, UGS is considered the cornerstone for the achievement of the United Nations Sustainable Development Goals (SDGs) 2030 (Hyder & Haque, 2022). Therefore, there remains a strong interest in investigating the scientific underpinning and strategic planning of UGS to achieve sustainable policies of urban development in both Western and Eastern countries. These include the UGS planning strategies conducted in the capital of China (Li, Wang, Paulussen & Liu, 2005), the sustainable green development in Indonesia suggested by Susila Adiyanta (2020), and the carbon footprint of UGS as a life cycle approach in Leipzig, Germany, proposed by Strohbach, Arnold and Haase (2012). These strategies emphasised that UGSs have been increasingly valued by experts in the field of urban planning and design, benefiting from their contribution to virtually all aspects of human health (Ma, Zhou, Lei, Wen & Htun, 2019), along with both social (e.g., economic development, social cohesion) (Jabbar, Yusoff & Shafie, 2021; Ugolini & Pearlmutter, 2022) and environmental well-being (e.g., regulating water) (MEA, 2005).

Part of the reason for improving the urban environment is to upgrade the living quality of residents (Erickson, 2006). There is currently insufficient consideration of people's needs when planning for UGS, which can potentially reduce the intended benefits of UGS or even induce negative emotions, such as fear (Jim & Shan, 2013; Shackleton, Chinyimba, Hebinck, Shackleton & Kaoma, 2015). Therefore, good UGS planning and design should first address the needs and desires of people.

In such contexts, several studies have explored the preferences and perceptions of UGS usage and their variations in populations (Miller, Doolittle, Cerutti, Naimark, Rufino, Ashton & Mwangi, 2021). In addition to aesthetic (Scott Shafer, Scott, Baker & Winemiller, 2013) and spatial provision (Rigolon & Flohr, 2014), the use, perception and preference of UGS as functional public spaces serving people is also one of the key criteria for evaluating UGS planning and design (Ryan, 2011; Rupprecht, Byrne, Ueda & Lo, 2015). In these studies, a small number of variables were generally used to characterise UGS usage and preference (e.g., Hordijk, 2013; Buys & Miller, 2012), specifically, for instance: frequency of visit (Chiang & Li, 2019; Özgüner, 2011), duration of stay (Lau, Yung & Tan, 2021), favoured park features (e.g., facilities, cleanliness, acreage, etc.) (Tyrväinen, Mäkinen & Schipperijn, 2007; Madureira, Nunes, Oliveira & Madureira, 2018; Kiplagat, Koech, Ng'etich, Lagat, Khazenzi & Odhiambo, 2022), travel time (Zhao, Zhang, Li, Peng, Wang, Wang, … Wang, 2022), willingness to pay (Tu, Abildtrup & Garcia, 2016; Macháč, Brabec & Arnberger, 2022), the purpose of visit (Säumel, Hogrefe, Battisti, Wachtel & Larcher, 2021), ease of access (Wright Wendel, Zarger & Mihelcic, 2012), satisfaction (Ugolini & Pearlmutter, 2022), and user activities (Heikinheimo, Tenkanen, Bergroth, Järv, Hiippala & Toivonen, 2020). For example, the proximity of residential areas to parks impacts visitation frequency; with those residing further away being less likely to visit regularly and engage in physical activities (Giles-Corti and Donovan, 2002). A large number of related studies have explored the relationship between sociodemographic characteristics and UGS uses (Shan, 2014a; Chuang, Benita & Tuncer, 2022).

In regard to UGS use and preferences discussed above, the research tends to fall within three key areas. The first explores the difference in demand for UGS between sociodemographic groups (Dasgupta, Basu, Hashimoto, Estoque, Kumar, Johnson, … Mitra, 2022; Ma, Brindley & Lange, 2022; Phillips, Khan & Canters, 2021). The second investigates the discrepancy in the provision of UGS resources to specific groups of people (Chen, Yue & La Rosa, 2020; Dai, 2011; Kabisch & Haase, 2014), whilst the third explores factors affecting access to UGS (Li, Zhang, Li, Wang, Liang, Mei, … Qian, 2017; Pinto, Ferreira & Pereira, 2021). Overall, they are offering guidance for promoting the improvement of the actual use of UGSs by different populations (Phillips, Khan & Canters, 2021).

Collectively, the UGS research detailed above has identified inconsistent messages. However, differences between studies, and between countries may reflect variations in the central topics, objectives, and methodologies. For example, in terms of the association between the age of visitors and the frequency of visits, numerous studies observed that younger people tend to visit parks more frequently than older groups in Malaysia (Sreetheran, 2017), Latin America (Wright Wendel et al., 2012), and Korea (Lee & Kim, 2015). In contrast, however, studies in the US by Godbey, Graefe and James (1992) and in China by Shan (2014b) and Wong (2009) demonstrated the opposite message – with older groups apparently visiting parks more frequently than other age groups.

In addition to the different results acknowledged between study areas in the examples above, a number of studies have identified differences in park use and preferences among ethnic groups within the same country. Gobster (2002) in a survey in the United States found that ethnic minorities make fewer visits or extended trips to UGSs. Similarly, Dai (2011) discovered that in the United States, African Americans used UGS less frequently. A study by Egerer, Ordóñez, Lin and Kendal (2019) in Australia identified that ethnic groups that were non-native English speakers favoured community gardens rather than other types of UGSs.

These relevant studies confirm that the social context, shaped by a combination of demographic characteristics and the socio-cultural environment, can lead to different usage patterns and preferences for UGSs (Sanesi & Chiarello, 2006; Wright Wendel et al.,2012; Jim & Shan, 2013; Schipperijn, Stigsdotter, Randrup & Troelsen, 2010). As claimed by Ordóñez-Barona (2017), places across the world have populations

with a diversity of ethnic and cultural backgrounds. The growth in urban populations necessitates alignment of priorities to population demands in both construction (Chiesura, 2004) and improvement (Burayidi, 2015) of UGS.

As seen in the literature above, UGS usage and preferences among population groups indisputably vary in their various sociocultural contexts and demographic characteristics. Nevertheless, few researchers have explored the impact of such contextual differences on UGS utilisation preferences by analysing context-specific empirical survey data. This study identified differences among demographic groups in park use and preferences in two entirely different social contexts through analysis of survey data on park use carried out in two countries, China and the UK, where Guangzhou and London were investigated as the case-study cities. The analysis identifies similarities and differences that can provide more precise and appropriate reference principles for the construction, design and management of urban parks.

3. Data and method

3.1. Surveys' backgrounds

For the survey in China, Guangzhou was selected as the case study area (see Fig. S6 in Supplementary Materials). It is one of China's seven mega-cities, which is the highest category level in China's city hierarchy, along with Shanghai, Beijing, Shenzhen, Chongqing, Chengdu and Tianjin. Additionally, as reported by the United Nations Development Programme (2016), Guangzhou has the highest Human Development Index in China. In terms of UGS in Guangzhou, the city has a green coverage ratio of 43.6 % and higher per capita park area (17.3 m^2) (GFGB, 2020) than any of the best well-known and largest megacities in China (Beijing, Shanghai and Shenzhen) (National Bureau of Statistics of the People's Republic of China, 2020).

As a comparator from a western country, London was selected (see Fig. S6 in Supplementary Materials), due to its large population (Guangzhou's population of 18.68 million; London's population of 9.64 million) as well as the extensive and detailed existing secondary data available from the 'Monitor Engagement with the Natural Environment' (MENE) omnibus survey. This survey was conducted by Natural England from 2009 to 2019 (an open source available at: https://publications.naturalengland.org.uk/publication/2248731), covering the population across the whole of the UK. The UK is well known for its natural land and green space and contains over 62,000 UGS sites including public gardens and parks (Anderson, 2018), and London is covered by 40 % of public green space, offering 16.3 sq.m of parks per person (TravelBird, 2018). Guangzhou and London are therefore generally comparable in their UGS areas and therefore suitable for a comparative study of park use and preferences in western and eastern cultures.

3.2. Data collection

For Guangzhou, an online questionnaire was completed by 2,360 people. Participants were limited to those over 18 years old. Considering that the use of UGS may require knowledge of the surrounding environment, only people who have lived or worked in Guangzhou for more than three months could participate in the survey. Sampling methods included posting questionnaire posters on various social media platforms (e.g., Weibo, Douban Group, Zhihu, Baidu Post, WeChat etc.).

The London data were obtained from the UK MENE survey, from both 'Respondent Data' and 'Visit Data', which generated 7,159 data points (screened from the original 44,191 data points). Respondent data were collected each year over a period of 10 years. Each respondent was asked about their visits to all natural environments over the past week ('Visit Data'). Further detail about the MENE survey's sampling method can be found in the Natural England Commissioned Report NECR123 (Natural England, 2013, pp. 3-13). The sampling method for Guangzhou is elaborated in Table S1 of Supplementary Materials with full details available in Ma, Brindley and Lange (2022) and Ma (2023, pp. 75-76).

3.3. Measures and comparison

Screening of the MENE survey data had four steps. The first step was to ensure that the types of UGS in both surveys were as comparable as possible. For this reason, MENE data was limited to visits relating to urban parks (visit location was specified as a 'Park in a town or city') and London region (the location was filtered as 'London'). This ensured that both case studies related to urban parks for comparability. Parks are the predominant type of UGS discussed in the literature relating to UGS use and preference (Fischer, Honold, Botzat, … Kowarik, 2018).

The second step was the selection of the data fields that most closely aligned with the Guangzhou survey. As mentioned above, the official MENE records are provided as two datasets: 'Respondent Data' and 'Visit Data'. Relevant comparison data to the Chinese questionnaires could be found in both the respondent and visit data. For example, the 'Visit Data', included visit duration, travel distance, motivations, enjoyment, whilst the 'Respondent Data' included visit frequency, ease of access, and satisfaction with the park's quality.

Thirdly, in order to establish comparability between the two surveys' data a number of constraints were applied to the MENE data. Data were restricted to: visits to parks that were: (i) made on foot, identified by those that specified walking as the mode of transportation; (ii) with less than 200 min visit time; and (iii) with a travel distance of 9.66 km or less. The last two constraints were to remove likely data errors ensuring that respondents walked to parks – to ensure comparability with the data from Guangzhou. The analysis is focused on the characteristics and preferences of walkers using parks, because walking is the most common mode of transport for people to get to parks in China and the UK. Insights are particularly important as walking is also the most desired mode of transport in policy terms and in relation to environmental sustainability through reducing pollution in response to climate change and improving health and wellbeing. The relevant statistics can be found in Fig. S2 in the supplementary material.

Finally, data were reclassified into more comparable categories for the two surveys. Categories of park visit-related characteristic variables and their definitions that were used in this comparison analysis are displayed in Table 1. Of these, three factors (age, travel time and duration of stay) were reclassified into as comparable as possible categories. The modest sample sizes in some visit categories made it appropriate to combine responses with similar attributes (for example, the description on distribution of visiting frequency categories across ease of access categories in Fig. 5b: combine 'Very Difficult' and 'Difficult' into 'Very Difficult/ Difficult' as shown in Fig. 5b). Elements that were not consistent between the two surveys and required reclassification in order to unify them can be found detailed in Table S3 of Supplementary Materials.

3.4. Statistical analysis

Statistical analyses used SPSS 26 software and three primary types of analysis were undertaken. Firstly, descriptive analysis was used for summarising the respondents' socio-demographic information and park use records from the two surveys. It is worth noting that in terms of purposes of visits, respondents in Guangzhou selected from a choice of seven motivations to visit, whereas in London, thirteen different motivations were provided. In order to compare between the two surveys – only the four reasons that were comparable in both surveys were included (for health/exercise; to relax/unwind; to spend time with family/friends; to enjoy scenery). Moreover, descriptive statistics were also used for exploring the association between population and park use variables. Secondly, correlation analysis, including Chi-square tests and nonparametric Spearman Correlation tests, were conducted to examine the statistical relationships between sociodemographic characteristics (age and gender) and park-related elements (use and preferences), and

Table 1
Reclassification of data to ensure unified park visits-related variables and values.

Element	Variable and value
Frequency of visits The frequency of visits to parks on foot	Less than once a month (1)
	Once or twice a month (2)
	Once a week (3)
	Several times a week (4)
	Every day or more (5)
Purposes of visit Reasons for visiting the park on foot	For health/ To exercise
	To relax/ unwind
	To spend time with family or friends
	To enjoy scenery
Ease of access Perceived ease of access to the park on foot	Very difficult (1)
	Difficult (2)
	Neither difficult nor easy (3)
	Easy (4)
	Very easy (5)
Satisfaction with park quality The extent of satisfaction with parks of enough high standards to want to spend time there	Very unsatisfied (1)
	Unsatisfied (2)
	Neither unsatisfied nor satisfied (3)
	Satisfied (4)
	Very satisfied (5)
gender	Female
	Male

Element	Variable and value	
Enjoyment The extent of agreement about enjoying the visit to parks	Strongly disagree (1)	
	Disagree (2)	
	Neither disagree nor agree (3)	
	Agree (4)	
	Strongly agree (5)	
	(In Guangzhou)	(In London)
Travel time Time spent walking to the respondent's most visited park	Less than 15 min	Less than 15 min
	15 to 40 min	15 to 45 min
	More than 40 min	More than 45 min
Duration of stay Time spent within the most visited park on foot	Number of minutes	Notation of minutes in 5-minute increments
Age	18-24	16-24
	25-30	25-34
	31-40	35-44
	41-50	45-54
	50 and over	>54

the impact of factors (travel time, enjoyment, satisfaction about park quality and frequency of visit) on user-perceived ease of access. The definition of 'Perceived Accessibility' is derived from Pot, van Wee, and Tillema (2021, p. 1) as: "the perceived potential to engage in spatially distributed opportunities". The measurement of ease of access (as shown in Table 1) was conducted through respondents' responses to the question: 'To what extent do you perceive your accessibility to parks?'. The evaluation of perceived accessibility pertains to individuals and has been empirically identified to exhibit variations across demographic groups due to unique life experiences, preferences, and other objective determinants (Tiznado Aitken, Lucas, Muñoz & Hurtubia, 2020; Curl, Nelson & Anable, 2011; Ma & Cao, 2019). Thirdly, a multiple linear regression model was used to explore factors contributing to the enjoyment of park visits. The independent variables were ease of access, satisfaction with the park quality and travel time.

4. Results

4.1. Descriptive summary of respondent groups

The park users consist of 2,236 and 7,169 valid responses from Guangzhou and London respectively. Details about respondents (Table 2) show that more older people in London took the survey (17.92 % compared to just 2.15 % in China) and a larger majority of respondents in Guangzhou were male (62.25 %), while there was a higher proportion of women in the survey in London (52.74 %). To account for such differences, weighting was applied according to the demographic characteristics of the population (as described below). As shown in Table 2, the frequency of the park users who were frequent users (more than or equal to once a month) or infrequent users (less than once a month) was generally similar between respondents for both cities. This distinction for frequent/infrequent users is based on the definition from the MENE survey report (Natural England, 2019a).

The age distribution and gender composition of the respondents in Guangzhou's survey was weighted according to the overall demographic characteristics of Guangzhou based on census data (Table 3) (Guangzhou Statistic Bureau, 2010). For the weighting of respondents in London from the MENE survey, weighting was applied in accordance with the details provided in the 'Weighting and Variable Guidance Note – a guide for SPSS and Excel users' (Natural England, 2019b). Whilst analysis reported utilised the weighted outputs, additional analysis (not shown within the article) were also undertaken using unweighted (raw) data to ensure robustness of findings.

Table 2
Details of respondent groups' composition in Guangzhou and London.

Item	Guangzhou			London		
	Category	Count	N%	Category	Count	N%
Age	18–24	262	11.72	16–24	1,239	17.28
	25–30	803	35.91	25–34	2,070	28.87
	31–40	908	40.61	35–44	1,582	22.07
	41–50	215	9.62	45–54	983	13.71
	50 and over	48	2.15	>54	1,285	17.92
Gender	Female	844	37.75	Female	3,781	52.74
	Male	1,392	62.25	Male	3,378	47.26
Frequency of users	Frequent users	2,183	97.63	Frequent users	2,256	94.24
	Infrequent users	53	2.37	Infrequent users	138	5.76

4.2. Variations in park use and preferences between the two countries

In order to investigate the variability of park use by different groups in the two socio-cultural contexts, correlations were undertaken between these elements of use characteristics and demographic characteristics factors (Table 4). Subsequent further analyses were focused on those sociodemographic characteristics that were significantly correlated with park use and preference factors in both cities.

4.2.1. Travel distance

Our analysis identifies significant differences in travel time to a park between the various age groups. As shown in Fig. 1a, for people aged over 50 in Guangzhou, proportions of visits continually increased as travel time increased. Specifically, the majority age group that spent over 40 min walking to a park were people aged over 50 (near to 50 per cent). Additionally, analysis shows that people aged 25-to-40-years old were less likely to have long walks of more than 40 min for visiting a park in Guangzhou, particularly, middle aged residents (31 to 40 years old) preferred walks to parks within 40-minute distance. In contrast,

Table 3
Weighting and validation of the China survey population groups among respondents based on census data.

Item	Category	Survey %	Observed Count	Census %	Expected Count	Difference	Weight	Chi-Square
Age	18–24	11.99	283	18.13	1,862,543	−6.14	1.51	7030.874 ***
	25–30	35.97	849	14.29	1,468,606	21.68	0.40	
	31–40	50.21	949	24.33	2,499,930	25.88	0.48	
	41–50	9.66	228	19.48	2,001,680	−9.82	2.02	
	51 and over	2.16	51	23.77	2,442,389	−21.61	11.00	
Gender	Male	61.40	1449	51.88	5,331,127	9.52	0.84	85.560 ***
	Female	38.60	911	48.12	4,944,021	−9.52	1.25	

*** significant at $p < 0.001$.
Source: 'Table 2' in Ma, Brindley and Lange (2022).

Table 4
Differences in effects of age and gender factors on the use and preferences of parks in Guangzhou and London.

Item	Test		Age		Test		Gender	
			Guangzhou	London			Guangzhou	London
Travel time	1	Value	135.568	2579.561 a *(Y1-Y7)* 31423.513 a *(Y8-Y10)*	1	Value	8.362	124.780 a *(Y1-Y7)* 12160.545 a *(Y8-Y10)*
		Sig.	0.000***	0.000***		Sig.	0.079	0.000***
Visit Duration	2	Value	0.072	-0.174 *(Y1-Y7)* -0.002 (*Y8-Y10*)	1	Value	1.561	27359.947 a *(Y1-Y7)* 86894.984 a(*Y8-Y10*)
		Sig.	0.001**	0.000***(*Y1-Y7*) 0.107 (*Y8-Y10*)		Sig.	0.906	0.000***(*Y1-Y7*) 0.000***(*Y8-Y10*)
Visit motivations For health/ To exercise	1	Value	53.515	5869.353 a (*Y1-Y3*) 11487.004 a (*Y4-Y10*)	1	Value	2.369	42.946 a (*Y1-Y3*) 1768.491 a (*Y4-Y10*)
		Sig.	0.000***	0.000***		Sig.	0.124	0.000***
To relax/ unwind		Value	34.989	7343.666 a (*Y1-Y3*) 6907.605 a (*Y4-Y10*)		Value	7.996	1704.218 a (*Y1-Y3*) 230.732 a (*Y4-Y10*)
		Sig.	0.000***	0.000***		Sig.	0.005**	0.000***
To spend time with family or friends		Value	21.203	4358.903 a (with friends) 18508.849 a (with family) (*Y1-Y3*) 21665.578 a (with friends) 28587.182 a (with family) (*Y4-Y10*)		Value	0.159	590.537 a (with friends) 3469.188 a (with family) (*Y1-Y3*) 32.931 a (with friends) 809.304 a (with family) (*Y4-Y10*)
		Sig.	0.000***	0.000***		Sig.	0.690	0.000***
To enjoy scenery		Value	32.191	2554.969 a (*Y1-Y3*) 11980.465 a (*Y4-Y10*)		Value	26.686	4524.536 a (*Y1-Y3*) 432.665 a (*Y4-Y10*)
		Sig.	0.000***	0.000***		Sig.	0.000***	0.000***
Frequency of visits	1	Value	165.165	709.579 a	1	Value	16.058	30.948 a
		Sig.	0.000***	0.000***		Sig.	0.007**	0.000***
Ease of access	2	Value	0.013	0.106	1	Value	4.900 a	60.333 a
		Sig.	0.543	0.000***		Sig.	0.298	0.000***
Enjoyment	2	Value	-0.014	0.093	1	Value	6.341 a	10029.200 a
		Sig.	0.528	0.000***		Sig.	0.175	0.000***
Satisfaction with park quality	2	Value	-0.009	0.090	1	Value	1.540 a	25.482 a
		Sig.	0.691	0.000***		Sig.	0.820	0.000***

"a" indicates more than 10.0% of cells have an expected count of less than 5;
** significant at $p < 0.01$; *** significant at $p < 0.001$;
Test 1 was Chi-square. Test 2 was Spearman correlation;
"Y1"to "Y10" indicate the year of MENE data collection. They are denoted for being distinguished by different weighting methods in various collection years. Weighting methods refer to https://publications.naturalengland.org.uk/file/6208400805593088.

there are no significant differences of park users across demographic groups highlighted by the London survey (Fig. 1b).

4.2.2. Duration of stay

As Table 4 shows, there are significant correlations between the age of visitors and their visiting duration in both cities. However, coefficients of age are positive in Guangzhou but negative in London. Fig. 2 depicts the mean visit duration by age. In Guangzhou (Fig. 2a), people aged over 50 tended to stay longer in their most visited parks. There is a steady growth in visiting time as the age increases from 24 to 50 and then a potential subtle decline when people are older than 50. Whilst in London (Fig. 2b), for people aged younger than 44 years old, the time people spent visiting the park decreases with age. Although it is followed by an unexpected increase (in stay time for those aged 45 to 54), the subsequent decline identifies that people aged over 54 in London tended to stay the shortest duration in parks. Overall, as can be seen from Fig. 2, the length of time spent in parks by London residents (mean of 79.9 min) is generally greater than that by Guangzhou residents (mean of 47.1

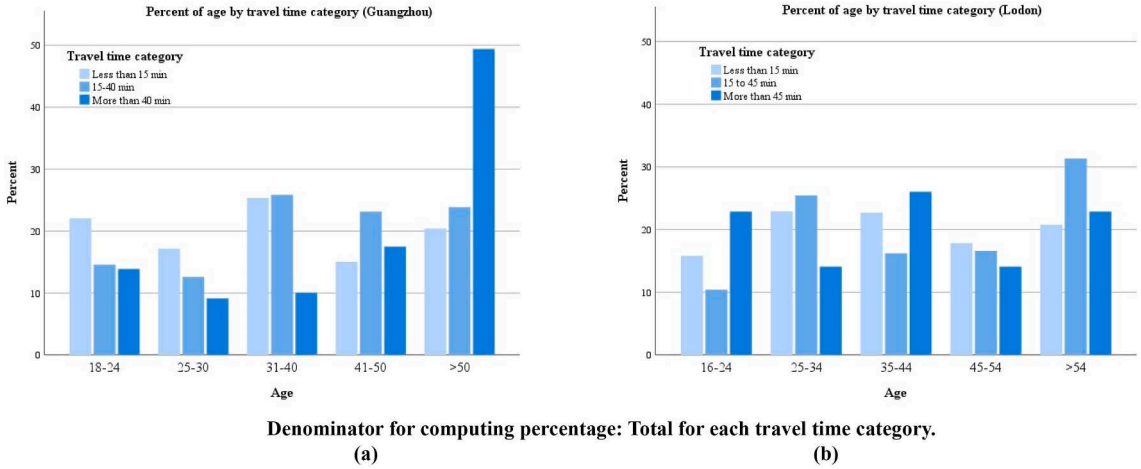


Fig. 1. Travel time to visit parks among age groups of respondents in Guangzhou (a) and London (b).

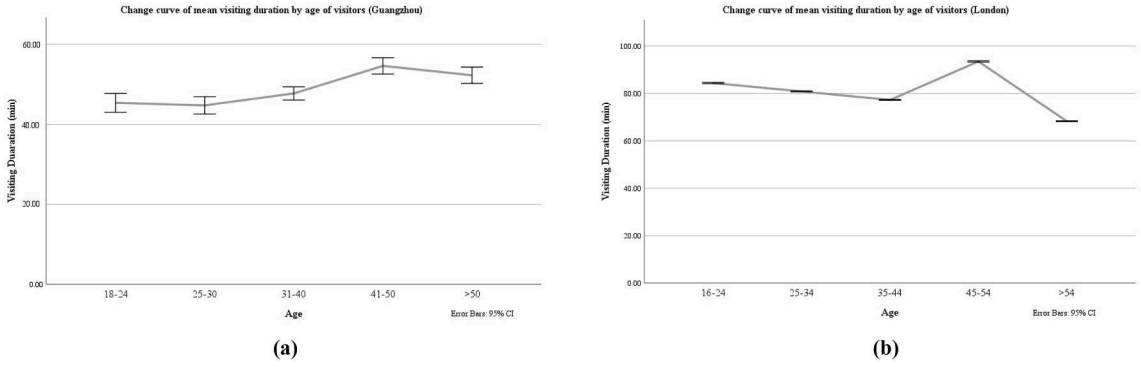


Fig. 2. The curve of mean length of stay in the park as a function of the age of visitors in Guangzhou (a) and London (b). Standard error bars with the confidence level at $p < 0.05$.

min).

A significant correlation was identified between the walking time to a park and the duration of stay (p-value of Chi-square analysis less than 0.001). A positive relationship was found for visits to parks in both Guangzhou (Spearman's correlation showing the correlation coefficient of 0.304) and London (Spearman's Correlation verifying the correlation coefficient of 0.018). Fig. 3 further illustrates that longer travel times to visit a park generally correspond to more time spent in the park, with the association being more apparent in Guangzhou than in London.

In examining the relationship between the frequency of park visits by users and duration spent in the park, a nonparametric correlation analysis (Spearman's Correlation) revealed significant negative correlations in both Guangzhou (with a coefficient of −0.281, $p < 0.01$), and London (correlation coefficient −0.121, $p < 0.01$). These correlations were further illustrated in Fig. 4 showing the average length of stay (visit) as a function of visit frequency. In both Guangzhou and London, people tended to spend progressively less time in the park as they visited it more frequently (with the exception of those low-frequency park users − who use the park less frequently than once a month).

4.2.3. *Ease of access and enjoyment*

Among the factors of parks influencing ease of access, significant correlations were identified between how people perceived the ease of access to parks and the following: enjoyment; visiting frequency; and

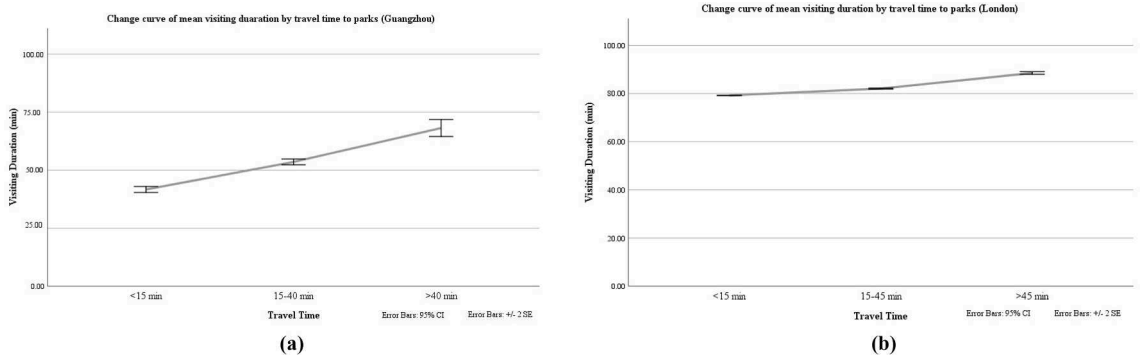


Fig. 3. The curve of mean length of stay in the park as a function of travel time to parks in Guangzhou (a) and London(b). Standard error bars with the confidence level at $p < 0.05$.

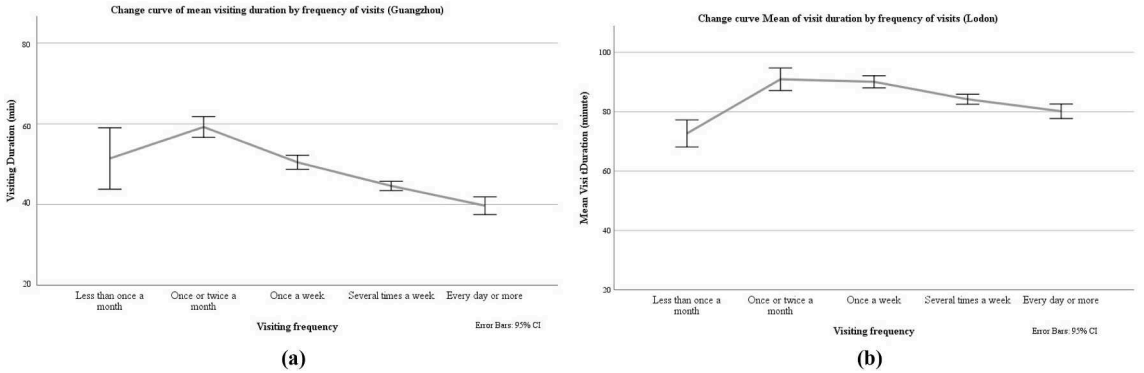


Fig. 4. The curve of mean length of stay in the park as a function of the frequency of visits in Guangzhou (a) and London (b). Standard error bars with the confidence level at $p < 0.05$.

satisfaction with the quality of parks for both cities. In addition, travel time spent on walking to a park was confirmed to have no impact on people's self-rated perceived ease of access.

Enjoyment; visiting frequency; and satisfaction with the quality of parks are all positively related with individuals' perceived park accessibility in both cities (Table 5). The change curves in Fig. 5a along with percentage charts in Fig. 5b have broadly similar trends.

Further investigation into the combined effects of these three factors detected a significant relationship with enjoyment of the visit to parks in the two cities (see Table S4 for details). Multiple Linear Regression (MLR) analysis showed that 'Ease of access' and 'Satisfaction with the quality of the park' influenced people's overall enjoyment of park use (Guangzhou: $p < 0.001$, $R2 = 0.322$; London: $p < 0.001$, $R2 = 0.244$). The model fit was generally similar between the two cities, with higher levels of 'Ease of access' and 'Satisfaction of quality' contributed to more enjoyment when visiting parks. In particular, the surveys in both cities indicated a similarity in that users' 'Ease of access' emerged as the dominant factor affecting their overall enjoyment (China: $t = 17.580$, $p < 0.001$; UK: $t = 346.487$, $p < 0.001$).

4.2.4. *Purpose of visits*

Chi-square comparison revealed that groups distinguished by age, gender and visiting frequency have different reasons for visiting parks, and these also vary between Guangzhou and London (Table 6). Whilst significant differences were identified within London across each purpose of visit by all visitor groups (age, gender and frequency of users), in contrast, no statistical differences were identified in Guangzhou for frequent versus infrequent users across all purposes of visit or for gender differences for those visiting for reasons of health/exercise or to spend time with family/friends.

The reasons for visiting parks shown in Table 6 display the four comparable motivations and their proportions across correlated visitor groups (the percentage share of the four reasons for visiting). It indicates that walking/ exercise for health was the most popular motivation mentioned by park users in both Guangzhou and London (42.32 % and 37.87 % respectively). However, more people in Guangzhou visited parks for enjoying the scenery, whilst more visitors in London went to parks for spending time with friends or family. Furthermore, in both cities, the trend in the proportion of people citing visitation 'For health or exercise' varies in a U-shape with the age of the visitor decreasing and then increasing, with people aged over 54 citing this reason most. In terms of gender differences, women were more likely than men to visit parks to enjoy the scenery, which is consistent across both cities. Another notable similarity between the two cities is the 'n' shape association with age for people visiting parks to spend time with family or friends (which peaks between the ages of 35 to 50 years old). In contrast, the Guangzhou survey shows that the age peak for visiting to spend time with family or friends was slightly older compared to the London respondents. Additionally, in London, most of the users who cited their motivation as 'To Enjoy Scenery' were aged over 54, whereas in China this category was comparatively younger (between 31 and 40 years old). Enjoyment of scenery was cited more frequently by female visitors, in both cities, than by male visitors.

To assess the robustness of findings, the study also analysed the percentage of all motivations (and not just the share of the four comparable motivations) across the user groups. As shown in Table S5, there are no differences in results except for three minor changes. First is that the age group in Guangzhou referring most 'To Enjoy Scenery' as the purpose of the visit shifted slightly in age (from the '31-40′ group to the '41-50′ group). Second is the orientation towards 'For health or Exercise' for gender groups in Guangzhou, where the analysis of the overall data shows that women (27.6 %) were slightly more oriented towards this visiting reason than men (26.8 %), while the analysis of the shared data switches direction (women at 40.52 % compared to men at 43.51 %). The last difference is the preference for 'To relax and unwind' in London, where the full data show a regular trend of decline of importance with age whereas there is no apparent trend for the comparable motivation data.

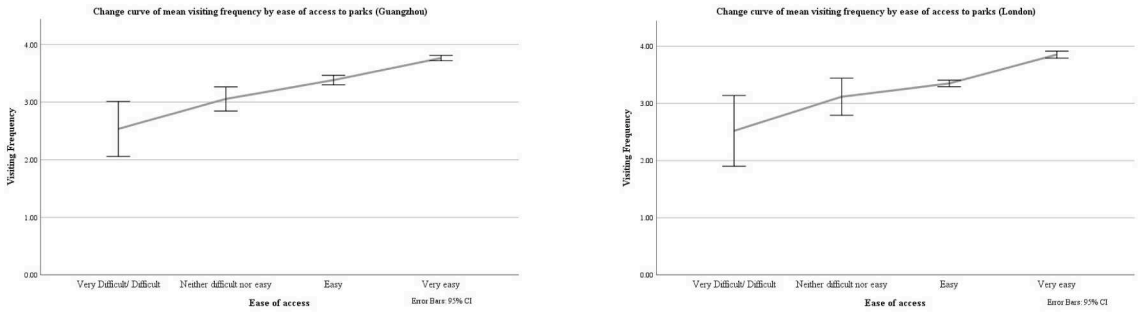
Table 5
Correlations between Ease of access and Factors for surveys in Guangzhou and London.

Factors	Contingency Coefficient Value	Approximate Significance	N of Valid Cases
Survey in Guangzhou			
Enjoyment	0.541	0.000***	2,236
Visiting frequency	0.231	0.000***	2,236
Satisfaction on quality of parks	0.617	0.000***	2,236
Travel time	−0.020	0.343	2,236
Survey in London			
Enjoyment	0.384	0.000***	6,646
Visiting frequency	0.222	0.000***	6,646
Satisfaction on quality of parks	0.598	0.000***	6,646
Travel time	−0.004	0.750	6,646

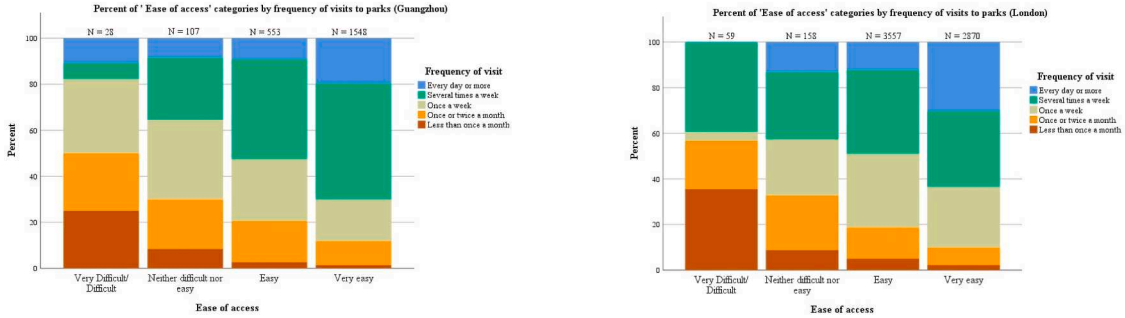
*** significant at $p < 0.001$.

5. Discussion

This study has shown that park use (e.g. travel time and visit duration), perceptions (e.g., enjoyment and ease of access) and purpose of visit vary between gender, age groups and visit frequency groups. Importantly, analyses were carried out to compare findings across different national contexts, and comparisons between the results demonstrated the influence (both differential and consistent) of socio-cultural context on park preferences of the populations within them.



(a) Change of visiting frequency by the ease of access in Guangzhou (left) and London (right)



(a) Distribution of visiting frequency by the ease of access in Guangzhou (left) and London (right)

Fig. 5. Change curves (a) of mean visiting frequency (from 1 (less than once a month) to 5 (every day or more)) and percent charts (b) of visiting frequency categories by the ease of access to parks in Guangzhou and London.

Table 6
Summary of four shared purposes of visits to parks in Guangzhou and London by visitor groups.

Visitor Groups	Purposes of visits to parks			
	For Health or Exercise	To Relax and Unwind	To Spend Time with Friends or Family	To Enjoy Scenery
In Guangzhou (N = 2,236)				
All visits	42.32%	27.58%	10.92%	19.19%
By age	***	***	***	***
18-24	47.59%	28.01%	7.53%	16.87%
25-30	43.40%	27.25%	11.74%	17.61%
31-40	39.73%	28.31%	10.96%	21.00%
41-50	40.96%	25.47%	12.59%	20.98%
>50	50.00%	25.00%	8.93%	16.07%
By gender	-	**	-	***
Female	40.52%	27.88%	9.91%	21.68%
Male	43.51%	27.36%	11.62%	17.51%
By frequency of users	-	-	-	-
Frequent visitor	42.31%	27.60%	10.99%	19.10%
Infrequent visitor	42.55%	26.60%	8.51%	22.34%
In London (N = 2,587)				
All visits	37.87%	29.04%	22.27%	10.82%
By age	***	***	***	***
16-24	37.37%	30.99%	23.65%	8.00%
25-34	33.79%	29.82%	26.02%	10.38%
35-44	34.04%	26.89%	30.98%	8.09%
45-54	39.29%	29.64%	19.09%	11.98%
>54	45.88%	28.35%	10.71%	15.07%
By gender	***	***	***	***
Female	35.15%	28.81%	23.87%	12.17%
Male	40.78%	29.28%	20.56%	9.38%
By frequency of users	***	***	***	***
Frequent visitor	36.53%	29.49%	21.87%	12.11%
Infrequent visitor	33.98%	32.43%	16.89%	16.70%

1 Colour denotes significant findings discussed within the main article. The darkness of the cell's colour corresponds to the value in this cell in its column (the darker the colour, the larger the value).
2 '–' not significant; '**' significant at $p < 0.01$ statistical level; '***' significant at $p < 0.001$ statistical level.

5.1. Actual park use

5.1.1. Travel time

Our findings illustrated that when people can access parks within a 15-minute walk, they are more likely to choose walking over other modes of transportation in both cities (Fig. S2). This observation aligns with the findings of Shan (2014a) and Yan, Li, Dong, and Li (2022), reinforcing the concept of the '15-minute walking life circle' as a goal for sustainable cities. Encouraging walking for distances up to 1 km (around 15 min) can be effective, as suggested by Liu, Li, Xu & Han (2017). The role of public transport in journeys exceeding 15 min to parks (Fig. S2) is more prominent in Guangzhou and is likely influenced by the cheaper affordability of transportation in China, facilitating short-distance travel.

A notably higher use of 'Bicycle/Moped' in Guangzhou (Fig. S2) might partly explain why a lower proportion of younger Chinese people are unwilling to walk longer distances to parks (Fig. 1). The influence of changing people's travel behaviours should be highlighted due to the rise of bike share systems (Chen, Wang, et al., 2018; Gu, Kim & Currie, 2019) (especially dockless bike share systems that were first introduced in China in 2016 (Lin, Zhang, et al.2019)). The popularity of mopeds, scooters, and bike-sharing schemes, particularly among young people due to their convenience and affordability (Lin, Zhang, et al., 2019) might reduce the propensity for longer walks to parks. This trend is most pronounced in China, which has the largest bike-sharing market (Li, Zhuang, et al., 2021) and affects particularly young and middle-aged residents (Orvin & Fatmi, 2021). It is important to note that the London data was collected between 2009–2019 and therefore before the significant rise in bike-sharing systems.

In terms of the travel times to parks differing by age, individuals aged over 50 in Guangzhou were more inclined to take longer walks (over 40 min) to parks than those in London (Fig. 1). This could be due to the predominant use of walking for journeys over 40 min to parks in Guangzhou (Fig. S2). In contrast, in London, few people selected walking and a large number of people chose 'Car/ Van'. This difference is likely attributable to factors such as cultural values and urban planning. In China, cultural practices emphasise outdoor activities for the elderly (Chow, 2004) and Chinese parks often feature group activities and social gatherings. The sense of social connection and companionship with peers may render the longer walk to parks worthwhile. Conversely, in the UK, individuals over the age of 54 might prefer shorter visits to local parks due to different daily routines or physical mobility considerations (Milligan, Gatrell & Bringley, 2004). Additionally, the design and distribution of parks differ between the two countries. In China, larger, centralised parks offer diverse facilities and activities (Lau and Yang, 2009), whereas in the UK, smaller community parks are generally more prevalent (Roberts, 2012). Facilities include adequate access to toilets – as discussed in more detail within section 5.1.2 Visit Duration. The larger parks in Guangzhou, though potentially further away, generally offer a more diverse array of facilities and activities. This, combined with the cultural context previously discussed, may attract older residents to visit, despite the longer walking distance.

However, disparities in travel times could be influenced by the complex interplay between a user's motivations and various barriers associated with the journey (McCormack, Giles-Corti, Bulsara & Pikora, 2006), leading to the variation of park usage among younger groups within similar socio-cultural contexts. For example, a study focusing on various modes of transport to UGSs by Zhang, Ni, Wang, Chen, and Xia (2020) found that younger people in China demonstrate a higher Willingness to Pay (WTP) level, encompassing both time and monetary costs, for visits to parks and other UGSs.

Conversely, when examining the travel distance to parks by younger groups in various contexts, the significant barrier of safety in Cambodia was highlighted in influencing how appealing walking times were for younger individuals (Yen, Wang, …, Juma, 2017). This underscores the importance of considering a range of contextual factors that indirectly influence park use. Such factors should be considered when analysing parks (and more widely all UGS), enabling a more nuanced understanding and response to sociocultural trends and diversity.

5.1.2. Visit duration

A consistent trend in park usage in both Guangzhou and London indicated that frequent visitors to parks (categorised as those who visit more than once a month) tended to engage in shorter park visits. This is substantiated by analysis showing short durations of park stays, as shown in Figs. 3 and 4. These results support the compensation hypothesis of Žlender and Ward Thompson (2017), which suggests a pattern where individuals engage in longer but less frequent visits to distant UGS and opt for shorter but more frequent visits to UGSs that are closer. This alignment between our findings and the hypothesis highlights a broader pattern in park visitation behaviours across different geographical contexts.

Meanwhile, our work also identified a number of key differences between the two case studies. Firstly, our research indicated that London residents generally spent more time in parks than those in Guangzhou. A substantial 52.63 % of participants in the Guangzhou survey cited 'Lack of time' as a constraint, compared to 37.13 % in the London survey. This difference suggests that the potential accelerated pace of life and work in China may lead to shorter durations spent in parks, reflecting the transformation in lifestyle patterns in the rapidly developing country. This disparity in park visitation patterns, influenced by lifestyle pace, offers an interesting perspective that aligns with Žlender and Ward Thompson's hypothesis (2017) as previously discussed. It underscores the idea that factors such as proximity, accessibility of green spaces, and the pace of life can indeed influence how people interact with these spaces. Time spent in parks is affected by the purpose of visit – which is discussed in greater detail below.

Specifically, in the Guangzhou survey, a trend emerged in our findings, revealing that adults aged over 50 prefer to spend more time in these environments than younger people. This can be explained by the research of Zhou, Mao, Lee, and Chi (2017), whereby the importance of intergenerational activities was highlighted among older adults in China, with a particular focus on the health benefits perceived by this demographic. Parks serve as essential spaces for this group to engage in such activities. In contrast, our research in London showed an opposite trend, with people aged over 54 spending less time in parks. This finding was also reported by Cohen, Han, Park, Williamson, and Derose (2019). Despite the general assumption that older adults are likely to have more free time (Lahti, Laaksonen, Lahelma, and Rahkonen, 2011), physical mobility limitations, as discussed by Eronen et al. (2014), could be a factor leading to shorter visits. Nevertheless, this is a factor less prevalent in findings from studies in China.

To interpret this distinction, it is important to understand the difference in retirement age between China and the UK. In China, retirement typically occurs around 55–60 years old, whereas in the UK, it is generally over 66 years old. Whilst increased leisure time for retired individuals significantly contributes to prolonged park visits (Zhan, Hu, Han, and Kang, 2021), aging-related physical limitations can affect the mobility of older adults. Additionally, park design, maintenance quality, and amenities greatly influence visitation patterns among this demographic (Lahti et al., 2011; Alves, Aspinall, Thompson, Sugiyama, Brice & Vickers, 2008). In China, facilities such as toilets and designated exercise and amusement areas are more abundantly provided than in the UK. For instance, Bliss & Park (2020) noted that in London, approximately half of the boroughs had only approximately 11 public toilets each, with many other boroughs completely lacking public toilets. In contrast, a study in Shenyang, China highlighted that there over 1,300 public toilets in the central city area alone, with many specifically located nearby parks (Fu, Xiao & Li, 2022). The design and availability of such infrastructure in and around parks are crucial to the experiences and convenience of older adults' visits. Consequently, in Guangzhou, the better and more sufficient facilities and amenities may allow for longer

stays in parks, which are less impacted by physical constraints.

Furthermore, parks are recognised as crucial hubs for community interaction, providing a space for information exchange and discussions regarding communal issues. They play a significant role in fostering good citizenship, social awareness, and a sense of ownership among residents. In China, activities typically seen as physical exercise also function as social events. Many Chinese parks feature amenities such as chess and card tables, activity plazas, and fitness facilities, that are specifically designed to cater to older demographics and encourage group activities (Chen, Liu, Xie & Marušić, 2016). This aspect highlights the distinct functional nature, constructing connections to community and society, of parks in China. The level of variation in usage by older individuals regarding different aspects of parks (for example cleanliness, public furniture) underscores how individuals perceive and prioritise different features of parks (Van den Berg, Weijs −Perrée, Dane, …, Borgers, 2022). Our work highlights that such differences can vary between countries, reflecting cultural and societal differences in park usage and expectation.

Overall, our findings resonate with Song, Newman, Huang, and Ye's (2022) emphasis on the importance of context-specific park designs, reflecting the diverse needs of demographic groups differing in socio-cultural backgrounds. Our study not only corroborates their hypothesis in the varied cultural and geographic contexts of Guangzhou and London but also extends it by underscoring the influence of urban lifestyles on the duration of park visits. This further highlights the importance of tailoring park landscaping and amenities to align with the cultural and usage preferences of the local population, a principle that remains pertinent across various geographical and socio-cultural contexts, and requires sound budgetary resourcing and management policy (Dobson & Dempsey, 2019).

5.2. Perceptions on park use

Our findings in Guangzhou and London indicated that the primary factor influencing perceptions of park use and overall enjoyment is the perceived ease of access (as detailed in Table S4). This finding is echoed globally, aligning with studies from diverse regions, including Latin America (Wright Wendel, Zarger & Mihelcic, 2012), Europe (Bertram & Rehdanz, 2015), and Asia (Schetke, Qureshi, Lautenbach & Kabisch, 2016; Jim & Shan, 2013). These studies collectively demonstrate that improved perceived accessibility significantly enhances the park visit experience and its utilization. This trend highlights the critical importance of enhancing park access, a theme also emphasied in Haaland and van den Bosch's (2015) review on sustainable UGS planning strategies.

Another key finding of this study was the lack of significant correlation between the travel time of park visitors and their perceived ease of access in both surveys. Due to the physical and psychological elements that are integral to park accessibility, the quality of routes leading to parks, including well-constructed pavements and safe, direct paths, is important for enhancing the enjoyment of park visits (McCormack, Rock, Toohey & Hignell, 2010). These findings suggest that even when parks are in close physical proximity, perceived barriers to access can diminish both the overall enjoyment and the frequency of park visits. This is because the distance to a person's most frequently visited park does not necessarily impact their perception of the park's accessibility, as physical distance primarily influences park accessibility within a certain range but is not the decisive factor beyond a critical distance (Liu et al., 2017; Lin, Fuller, Bush, Gaston & Shanahan, 2014). This work supports the distinction between perceived and spatial accessibility as identified by Ryan and Pereira (2021), Tiznado-Aitken et al. (2020), and Ma and Cao (2019). Therefore, improving perceived accessibility should be prioritised to enhance people's visitation enjoyment, rather than focusing solely on spatial provision. While the actual distance to parks may negatively impact their spatial accessibility, these general barriers to park visitation can be mitigated by enhancing perceived accessibility (Scott, Evenson, Cohen & Cox, 2007; McCormack, Cerin, Leslie, Du Toit & Owen, 2008; Wang, Zhou, Han & Mei, 2021).

In various countries or cities, the factors influencing perceptions of park use can differ based on target user groups. For example, in Vietnam and China, older groups are the predominant park visitors, necessitating designs with features including easy-to-navigate paths, adequate seating, and shaded areas, catering to their needs (Schetke et al., 2016; Jim & Shan, 2013; Tinsley, Tinsley & Croskeys, 2002). In contrast, in Pakistan, park usage is more oriented towards families or friends, cutting across socio-demographic lines (Qureshi, Breuste & Jim, 2013). Such groups commonly appreciate park features that enable active play and social interaction, underscoring the need for diverse play equipment, open spaces for group activities, and picnic areas (McCormack et al., 2010). To simultaneously cater to multiple age groups, the concept of intergenerational design has become increasingly significant. This approach involves creating spaces that are accessible and usable by individuals of all ages, such as parks with communal gardens and exercise areas, promoting social interaction and community engagement (Fang, Sixsmith, Hamilton, Rogowsky & Scrutton, 2022). This design philosophy is distinct from age-specific approaches and seeks to create inclusive environments that support a wide range of activities and interactions.

Furthermore, factors influencing people's perceptions of park use include individual aspects such as physical mobility (Olsson, Friman & Lättman, 2021), the built environment (Shahraki, 2021), emotional connections and memories (Wan, Shen, et al., 2020), as well as temporal constraints and attitudes (Liu et al., 2017). These personal elements can lead to varied assessments of ease of access and overall park use, even in similar conditions, highlighting the importance of considering individual circumstances in park design and management.

In summary, the functionalities a park provides to cater to specific user groups may exert a more substantial influence on people's perceptions of parks than any single factor. This underscores the need to take into account a variety of individual and contextual factors when evaluating park usage and its primary influencing factor—accessibility.

5.3. Purpose of visit

In this study, the primary reason identified for park visits in both Guangzhou and London was 'For health/exercise,' a preference shared by over 40 % of participants (see Table 6). This finding reflects a universal recognition of the health benefits offered by natural environments, aligning with trends observed in different cultural contexts. Research by Liu et al. (2017) in China and Irvine, Warber, Devine-Wright, and Gaston (2013) in the UK, underscore this widespread appreciation for the health benefits of natural environments. This trend can be contextualised within the framework of environmental psychology and public health. Our work supports the role of parks as essential venues for physical activity and receiving health benefits, which are particularly important in urban environments (Bedimo-Rung, Mowen & Cohen, 2005; Buckley, 2020).

Additionally, the study reveals that relaxation and unwinding are the second most common reasons for park visits, accounting for 26–28 % of responses (as shown in Table 6). This motive for park usage differs from findings in some other studies, suggesting that cultural, environmental and personal factors may jointly influence park visitation reasons. For instance, research by Wang et al. (2021) in China and Grigoletto et al. (2022) in Italy identified relaxation as the primary reason for park visits. While these variations are noteworthy, the identification of these two key motivations across different studies reaffirms previous research indicating that parks and other types of green spaces generally offer both psychological and physical health benefits.

5.3.1. Purpose of visit across age groups

Spending time with friends or family was found to be a greater motivation amongst younger age groups in London compared to Guangzhou. This difference in social usage patterns may be influenced

by varying perceptions of safety, a factor deemed important in Western countries by Rigolon (2016). In China, safety concerns appear less likely to negatively influence park usage, partly due to the design of gated parks, as noted by Ma (2023, p.166). The prevalence of gated parks in China, which create controlled environments are generally perceived as safer (Lau and Yang, 2009), contrasts with the UK's trend towards open and accessible parks, reflecting public space norms with diverse safety implications (Foster and Giles-Corti, 2008). Moreover, in China, cultural and social norms contribute to parks being vibrant communal spaces, often bustling with activities that enhance a sense of safety (Chen and Jim, 2008).

Variance in social behaviour in parks is also explored by Qureshi et al.'s (2013) study in Karachi, Pakistan, highlighting the importance of family gatherings for a purpose of visiting parks. There are numerous other examples of how spatially specific socio-cultural circumstances can affect park visitation. For example, in the US context, the study by Ho, Sasidharan, Elmendorf, Willits, Graefe, and Godbey (2005) observed distinct ethnic patterns in park usage, with White and African-American individuals more likely to visit parks alone, compared to Asian groups. This suggests that cultural and ethnic backgrounds play a significant role in how individuals engage with public green spaces. Overall, it provides a valuable context for understanding the nuances, highlighting the diverse motivations and social dynamics that influence the use of parks across different cultures and regions.

Our research also noted the impact of age on motivations for park visits in the two cities. In both locations, it found that the youngest and oldest demographics predominantly frequented parks for physical well-being. However, a notable difference was seen in the motivation to 'Enjoy Scenery'. In London, people aged over 54 years more commonly cited enjoying the scenery as the reason for their visit, whereas in China, it was the 31-to-40-year age group that demonstrated a higher interest in scenic enjoyment. This variation could be attributed to the growing digital culture in China, particularly among the middle-aged population, leading to an enhanced appreciation of aesthetic experiences, often shared via social media (Prideaux, Lee, & Tsang, 2018). Middle-aged groups in China are more inclined to visit parks for photographing landscapes and sharing them on platforms like WeChat or Weibo (Lo et al., 2011), whereas their counterparts in Western countries tend to share different content, such as personal updates and family photographs (Hunsaker & Hargittai, 2018; Quinn, 2016).

Although there is a notable difference in scenic enjoyment between Guangzhou and London, the lower interest in scenic enjoyment among younger people in parks is similar. This observation is consistent with findings across several European countries (Fischer et al., 2018; Phillips, Khan, and Canters, 2021; van Dinter, Kools, Dane, …, van den Berg, 2022), and also in Colorado, USA (Rigolon, 2017). This may be attributed to the abundance of alternative recreational options available, such as television and computer games (Louv, 2006). Despite this, our research further substantiated that the main reason young people visit parks is for health, exercise, and relaxation – a trend consistent in both Guangzhou and London. This underscores the universal role of parks as venues for sport and stress relief for the younger generations, irrespective of their geographic location.

In response to these findings, an effective strategy to enhance parks' appeal to younger individuals would be the development of well-constructed sports and exercise areas. While integrating these with areas designed for scenic appreciation, it is prudent to maintain a certain degree of separation. This approach would optimise the park experience for different age groups, aligning with their expected motivations and addressing the unique visitation needs of various age demographics, thereby facilitating an increase in park usage that transcends age barriers. In essence, understanding age-specific motivations for park visits not only provides insights into improving park use effectiveness but also enriches the existing body of literature in this domain.

5.3.2. Purpose of visit across gender groups

This study additionally identified gender-based differences in park visitation motives whereby in both surveys, women were more likely than males to visit parks to enjoy the scenery. This finding suggests that women's decision to visit parks might be more influenced by the aesthetic appeal of nature than men's. Gender-specific preferences for natural aesthetics have also been observed in studies from Norway (Fongar, Aamodt, Randrup & Solfjeld, 2019; Calogiuri & Elliott, 2017) and Sweden (Ode Sang, Gunnarsson & Hedblom, 2016), indicating a broader trend. Socio-cultural norms and roles, for instance, play a significant role. Similar to our finding, women in New York City were also found to be more likely to use parks for passive activities such as enjoying scenery, which might be linked to traditional roles and expectations around women's closer affiliation with nature and aesthetic appreciation (Krenichyn, 2004).

It is important to acknowledge that these gender differences in park visitation motives are not static and can vary considerably across different cultural contexts. As societies develop and sociodemographic roles become more fluid, the motivations behind park visits are likely to shift.

5.3.3. Purpose of visit across frequent and infrequent users

In addition to preferences in visit motivations across socio-demographic groups, our research identified specific behavioural patterns among different park user groups regarding frequency of park visitation (Table 4). A consistent trend observed in both cities is that infrequent park users tend to be more drawn to parks for relaxation and the enjoyment of scenery (Table 6). This implies that infrequent visitors perceive parks as spaces for fulfilling psychological and spiritual needs, as well as opportunities for socialization or attending special events. Similar findings were reported by Kaczynski and Henderson (2007), noting infrequent park users typically visit for leisure and social gatherings.

A notable difference in our study is that in London, frequent park users predominantly visited for physical exercise. This trend was less common in parks in Guangzhou. It might be that whilst physical exercise remains a common motivation, the high population density in Chinese megacities often results in crowded parks, which may reduce their appeal as tranquil environments for regular visits (Jim & Chen, 2006). For infrequent users in particular, enhancing the aesthetic and tranquil aspects of parks, and developing specialised areas and facilities for themed activities geared towards mental healing or relief, could be important in promoting more frequent visits. It further highlights the necessity of integrating various functions within park spaces to appeal to a broader range of users. In contrast, the difficulties facing design must be acknowledged, for if parks continue to add new features to appeal to the full diversity of its changing users, there is a risk that these spaces may inherently lose their attraction for existing users.

These findings illuminate the different reasons why people visit parks, showing that how often someone uses a park, as well as gender and age, can shape individuals' perceptions of the functions and benefits of parks. This highlights that parks have multifaceted roles and uses and the importance of users-oriented designs of parks for catering to a diverse range of needs and preferences within urban populations (Chen, Liu, Xie & Marušić, 2016).

5.4. Other potential factors

Overall, despite identifying many similarities between the two case studies, important differences were identified in the specific use and preference related to parks. This demonstrates the importance of researching the social cultural differences between places in order to understand the implications and reasons behind these social cultural differences. One possible explanation may be due to variations in climate. For example, a survey conducted in Spain (Ferré, Guitart & Ferret, 2006) identifies opportunities for shade as an essential

characteristic of parks affecting its use by children due to the hot Mediterranean summers. However, residents in Denmark emphasised the motivation of enjoying weather within parks (Schipperijn et al., 2010), which is probably influenced by the country's comparably cold temperate maritime climate. Additionally, residents' locations as well as different social contexts influence visitation preference of parks. Despite residents of compact urban regions preferring to visit single large parks (Lo & Jim, 2010), the actual visitation patterns depend on the parks available to them. For this reason, the pattern identified by Lau, Yung & Tan (2021), whereby older generations in Hong Kong appear to prefer close but smaller parks is constrained by the wider UGS provision. The geographic pattern driving the older generation's residential locations has developed through complex socio-cultural histories of the community. Additionally, historical and cultural differences can impact behaviour and therefore influence park use and preference. For example, park use by low-income African-American women in the USA is dependent more on personal safety rather than park proximity and provision, but the factors affecting safety are frequently related not just to an individual park itself but also influenced by wider society and culture impacts (Wilbur, Chandler, Dancy, Choi & Plonczynshi, 2002). Therefore, contextual features, including society, economy, policy, geography, custom and so on, should influence scholars, planners, designers and policymakers to consider a broad range of direct and indirect potential impact on park use and preferences, which also vary through population groups in many different ways.

5.5. Limitations of the study

This study has a number of limitations. Specifically, the research acknowledges the difficulties in comparison results across different surveys. For example, online questionnaires were analysed in China compared to face-to-face surveys in the UK which could lead to a potential bias in the socio-demographic characteristics of the sample. Although this research used weighting to reduce this effect, the optimum approach is to use the same sampling method so that the sample distribution patterns can be as uniform as possible. Whilst questions were broadly similar – they were not identical in both surveys and issues of translation may also result in discrepancies between how questions were interpreted. In addition, there was variation in the time span of the two surveys, with the Chinese survey lasting only five months and the UK survey being undertaken over a rolling ten-year period. Apart from differences in sample size, participants responded using different temporal frameworks (with those in the UK answering about parks used in the past 7 days but people in China responding about their most frequently visited parks without a temporal restraint). This also led to differing temporal scales within the usage and preferences (e.g., seasonal changes by different climate depending on different geographical locations). Consequently, there remains a research need to build on this study and to undertake comparable surveys across multiple cultures and countries, integrated with the temporal and geographical effects, to further explore the divergent use and preference of green space for social-demographic groupings. Future research could also utilise a park typology to explore the distinctions of park use and preference within different types of parks.

6. Conclusion

The burgeoning research into public preferences and perceptions of UGS has underscored the significance of use and perception-based planning, design, and management of UGS in the context of urban development and regeneration, particularly in the face of escalating urbanisation and immigration. There remains, however, a lack of research exploring UGS use and preference in different cultural contexts. This is of particular importance given the global trend for greater diversity within cities' populations (in terms of different cultural contexts) and the need for UGS to equitably serve these diverse cultural groups. Therefore, this study embarked on a series of comparative analyses focusing on park use and preferences among people from different cultures (China and the UK), underpinned by comprehensive questionnaires. Our research demonstrates the influence of varying sociocultural backgrounds on park use and preferences, categorizing user groups by age, gender, and visit frequency.

In summary, this research significantly contributes to the existing body of knowledge on park planning and design in two primary ways. Firstly, it enhances our understanding of park use and preference in China and the UK by surveying residents to ascertain their actual visits and perceptions. This approach enriches the repository of knowledge regarding park use and preference, aiding the advancement of park planning and design in both countries. Secondly, the study offers empirical evidence of the disparities and parallels in park use and preferences among different populations from diverse sociocultural contexts. Notable variations, such as the different motivations for park visits among those aged over 50 in Chinese and UK cities, highlight the critical role of sociocultural factors in shaping park preferences. In our multicultural society, priorities in USG planning should respect the cultural context and adjust form and function to best meet local preferences.

The ongoing process of updating and broadening our knowledge and understanding of park usage across different backgrounds is key to enhancing the efficacy of people-centred park services. The diverse needs of different user groups call for customised park planning guidelines and design proposals that incorporate a range of features. This indicates that a 'one size fits all' approach is not universally effective in either design or planning, highlighting the need for flexibility and adaptability in urban park development strategies.

The variability observed in people's use and preferences for parks and other UGSs underscores the need for future studies to investigate the differences in preferences arising from socio-cultural and geographical disparities (aiming for a high level of methodological consistency to facilitate direct comparability). Such research can provide both a scientific and practical foundation for the nuanced planning and design of parks and other UGSs.

CRediT authorship contribution statement

Yueshan Ma: Writing – review & editing, Writing – original draft, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Paul G. Brindley:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Eckart Lange:** Writing – review & editing, Supervision.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.landurbplan.2024.105112.

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