



Original article

Exploring the use and perceptions of inner-city small urban parks: A case study of Budapest, Hungary

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ARTICLE INFO

Handling Editor: Dr Cecil Konijnendijk van den Bosch

Keywords:

Small urban park

Inner-city

Visitor satisfaction

Socioeconomic differences

Accessibility

Budapest

ABSTRACT

Globally, accelerating urbanization has led to a severe shortage of urban green spaces. This scarcity is particularly acute in inner cities with high population densities and ratios of built-up areas. To explore park visitors' usage and perceptions, we present the results of a survey of 681 individuals from different socioeconomic groups conducted in four small urban parks in Budapest, Hungary's capital. The survey results found that people living near the block parks were their primary users, but many people from distant areas also visited the parks due to their good accessibility. In addition, findings show that the green components of the parks were generally more satisfactory to users than other amenities, indicating higher quality expectations for cultural ecosystem services in small urban green spaces. However, perceptions of park safety varied across socioeconomic groups, suggesting that views of safety did not necessarily reflect actual park security. Finally, while most respondents stated they would not want to contribute to park maintenance, young people, particularly neighborhood newcomers, showed greater willingness to volunteer for such work.

1. Introduction

In recent decades, the world has witnessed unprecedented urban population growth. According to an estimation by the United Nations, in 2020, more than 56 % of the world's population was residing in urban areas; this share is expected to increase over time (UN, 2019). The rapid growth of urban populations results in severe economic, social, and environmental challenges that local governments must address. As one possible tool for local governments to wield against these challenges, urban green spaces are considered effective for mitigating the adverse effects of urbanization (WHO, 2017) by helping improve the quality of urban settings, enhancing local resilience, promoting a sustainable lifestyle, and improving the health and well-being of urban residents (Csomós et al., 2020).

Green spaces have many positive impacts on urban areas. For

example, urban forests and large parks covered by arboreal vegetation positively affect the local climate and reduce the magnitude of heat island effects (Aram et al., 2019). In addition, urban forests absorb hazardous substances from the air (Cicea & Pîrlogea, 2011) and reduce sound emissions from road traffic (Brambilla et al., 2013; Hong and Jeon, 2013). Urban green spaces are also vital to ecology, contributing to biodiversity preservation by providing habitats for plants and animals (Threlfall et al., 2017). Moreover, people's regular use of urban green spaces stimulates cognitive, emotional, and psycho-sociological benefits and helps reduce constant stress and mental tiredness while improving attention and memory (Berman et al., 2008; Hedblom et al., 2019; Ulrich et al., 1991). Urban parks provide an esthetic experience for visitors and allow people to do sports and other physical activities, children to play on playgrounds, and older adults to relax (Kolcsár et al., 2022). Finally, parks and other urban green spaces positively affect

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users' physical and health conditions, facilitating healthy living and reducing chronic diseases and mortality (Bedimo-Rung et al., 2005; Cohen et al., 2007; Kaczynski and Henderson, 2007; Wolch et al., 2014).

In light of the above, creating new urban green spaces has become a core concept in contemporary urban policy and planning worldwide (Anguluri and Narayanan, 2017; Haaland and van den Bosch, 2015). However, despite the substantial demand for green space-related amenities, creating new urban parks in most cities remains problematic. While uncontrolled land use in cities of the global South often hampers urban green space developments and jeopardizes existing ones, cities of the global North often lack vacant land in the densely built inner districts (Nordh et al., 2009), where many of the buildings are under heritage protection (Ashworth and Tunbridge, 1999). Thus, it is a global challenge to create new green surfaces.

Overall, the demand for urban green spaces is sizable in inner-city neighborhoods with high population densities and built-up areas. As inner-city neighborhoods are among the cities' most frequented areas, most vacant land is used for upmarket housing and office developments (see, for example, Górczyńska, 2018; Holm et al., 2015; Sýkora, 1999). Accordingly, in such neighborhoods, the development of green spaces is possible only through small-scale pocket or block parks. Since the early 1990s, some parts of the inner city of Hungary's capital, Budapest, have witnessed rapid regeneration, resulting in physical upgrading, rising prestige, and population change. This activity has generated various forms of gentrification (Kovács et al., 2013; Kubeš and Kovács, 2020). Generally, in Budapest's inner-city areas, the size of existing green spaces is small (Farkas et al., 2022); by and large, they are overcrowded, providing only a limited variety of ecosystem services (Kabisch and Haase, 2014; Kabisch et al., 2016).

To change this situation, Budapest's local government set ambitious green space development plans in the early 2000s, emphasizing creating new block parks in inner-city neighborhoods and revitalizing old ones. During the planning process, approaches such as accessibility planning and environmental justice were seriously considered. Slowly, the efforts of the local government bore fruits. The main objective of this study is to explore how people use and view selected inner-city block parks in downtown Budapest. Such knowledge is valuable because, as an effective response to climate change and the growing demand for leisure opportunities, the role of small urban parks will likely increase in major metropolises. In addition, investigating some recently revitalized block parks can also help understand visitors' perceptions and attitudes, improving the planning of small urban green spaces. During this study, we sought answers to the following questions:

- Who are the typical users of small urban parks, and from which distance do they arrive?
- How satisfied are visitors with different demographic and socioeconomic backgrounds with small urban parks?
- What are the demands of visitors from different socioeconomic groups for small urban parks?
- What do visitors think about the safety and maintenance of inner-city block parks?

Lessons learned from Budapest's example can provide a reference for cities committed to creating small urban green spaces in inner-city neighborhoods characterized by high built-up ratios and population densities.

2. Data and methods

2.1. Study area

This research focuses on the inner city of Budapest, Hungary's primary economic, cultural, and administrative center, with a population of ca. 1.75 million. The city serves as a leading hub of businesses and tourism in the Central and Eastern Europe (CEE) region, and it is

considered a "world city" by many researchers (see, for example, Musil, 2009; Taylor, 2000). Moreover, by attracting approximately 3.8 million tourists in 2018, Budapest became one of the world's top 100 most popular city destinations (Euromonitor International, 2019), and it was ranked fifth among the European cities most affected by over-tourism in 2017 (Pérez Garrido et al., 2022).

Since the early 1990s, due to natural population decrease and accelerating suburbanization (Kovács et al., 2019), Budapest has witnessed an overall population decline of 265 thousand people—13 %—between 1990 and 2006. Then, thanks to the new domestic and international migration patterns, the trend reversed in the following decade, and the city's population increased by 56 thousand people between 2012 and 2020. Budapest is the core of the Budapest Metropolitan Region, a dense urban area containing the city and 185 surrounding localities, with a total population of 2.97 million. Within the metropolitan region, 226 thousand people commute to Budapest daily, increasing the pressure on the city's infrastructure, traffic, and services. Consequently, the urban green spaces of Budapest—primarily those located in the inner-city districts—are used by both residents and an increasing number of tourists and daily commuters.

The study area encompasses three inner-city districts on the Pest side (VI, VIII, and IX) (i.e., East of the Danube). The population density of District VI and District VIII is three and two times higher than the city average, respectively; the population density of District IX is slightly below the average (see Appendix 1). Since 2005, most inner-city districts have witnessed varying degrees of population shrinkage, and only a few have managed to maintain their population. Regarding the age of the districts' populations, the share of young adults (18–29 years old) has slightly decreased in these areas compared to the average of Budapest, but the share of the population aged 30–39 has significantly increased. In light of this, we can assume that the inner-city districts have been affected by population change (i.e., gentrification); however, it remains unclear if the availability of urban green spaces triggers and facilitates this process.

The study area includes the city's historic core, which has evolved through several centuries and where many buildings are protected. The layout of the road network and the configuration of open spaces have remained unchanged for the last century. Due to the spatial configuration of the urban fabric and the high ratio of protected buildings, the planning and creation of new urban green spaces are challenging, although the demand for such amenities has been constantly increasing. For this research, we selected four inner-city block parks to capture their visitors' perceptions, satisfaction levels, and demands. A block park is a small urban green space, typically occupying less than one hectare in a dense urban fabric (see the definition by La Rosa et al., 2018). The selected parks are reasonably similar in size, layout, and location: their area is small, they are embedded in densely built inner-city neighborhoods, have recently been revitalized (just like the surrounding urban fabric), and provide multiple ecosystem services. Two parks are located in District VIII (Mátyás Square and Teleki László Square), and one in each District VI (Hunyadi Square) and District IX (Kerekerdő Park), respectively (Fig. 1). All the block parks have been completely revitalized and have recently been equipped with new amenities (see Appendix 2).

2.2. Questionnaire design, questionnaire survey, and data analysis

As part of our research, an on-site, face-to-face questionnaire survey was conducted in each park between the end of July and the beginning of August 2021. The survey was conducted at varying times on weekdays and weekends. We employed trained questionnaire-givers who selected the visitors based on a random sampling strategy. When designing the questionnaire, we considered previous works on the possible measurement of users' perceptions and preferences (Balai Kerishnan et al., 2020; Peschardt et al., 2012) and accessibility (Gu et al., 2020) and safety issues (Mak and Jim, 2018; Ode Sang et al., 2016; Sági, 2022). The



Fig. 1. The geographical location of the selected parks in Budapest (1: Hunyadi Square; 2: Teleki László Square; 3: Mátyás Square; 4: Kerekerdő Park).

questionnaire included 13 questions on the following topics: the aim of visiting the park, the estimated distance of the respondent's home from the park, the transportation mode the visitor arrived at, and the frequency of visiting the park. In addition, four questions focused on users' satisfaction (i.e., to assess opinions, a five-point Likert scale was employed), and we included an open question to capture park users' demands for future developments. Finally, we also strove to explore respondents' opinions about possible contributions to the parks' maintenance.

A total number of 681 questionnaires were collected. Data were processed using SPSS 22.0 software. First, respondents' demographic and socioeconomic characteristics (sex, age, income, education, and the length of time they have been living in the neighborhood) and their demands for future development of the parks were analyzed by descriptive statistical methods—tables of frequency distributions and means. For other questions, such as the main goals of visiting the parks, frequency of visits, and satisfaction with ecosystem services, we made cross-tables and used a chi-square test with a Z-test (Bonferroni method) and multiple regression analysis. The chi-square test is a standard statistical procedure for measuring two categorical variables' association (i.e., interdependence). Used post hoc, the Z-test compares column proportions to find significant differences between them; the multiple regression model helped explore the potential factors influencing people's satisfaction with the parks (Appendix 3).

Furthermore, based on the postal codes of respondents' homes, we mapped catchment areas and compared them with the parks' 300-, 600- and 1000-meter isodistance maps using Openrouteservice. A postal code district was assigned to a park if 50 % or more of the respondents (at least 10) originated from that district. We aimed to determine whether the theoretically defined catchment areas of parks (300 m, 301–600 m, 601–1000 m) overlapped with the areas from where the users visited the parks. ArcGIS 10.8 was applied for mapping, and the QGIS Openrouteservice plug-in was used for downloading the isodistance data for the parks.

2.3. Socioeconomic characteristics of park visitors

As shown in Table 1, we found a relatively even distribution of male

Table 1
Classifying respondents based on age, education, income, and the length of residence in the neighborhood.

		Number of respondents			Share (%)
		Man	Woman	Total	
Age groups	18–29	86	81	167	24.5
	30–39	90	85	175	25.7
	40–59	101	68	169	24.8
	60 +	82	88	170	25.0
	All	359	322	681	100.0
Education level	Primary school	51	44	95	14.2
	Secondary school	179	148	327	49.0
	Higher education	122	123	245	36.7
	All	352	315	667	100.0
	Income class	Low-income	90	71	161
Average income		180	182	362	55.3
High-income		79	53	132	20.2
All		349	306	655	100.0
Time of being resident in the neighborhood (within 1000 m radius of the park)		0–10 years	186	131	317
	11–X years	138	154	292	47.9
	All	324	285	609	100

Source: own survey conducted in the period of July–August 2021

and female respondents. However, in the age group of 40–59 (+48 %), the proportion of men significantly surpasses that of women, whereas the share of women is higher in the age group of 60 +, which aligns with the demographic trends of aging societies such as Hungary.

Almost half of the respondents declared having completed secondary education, and slightly more than one-third had a tertiary degree. Primary and secondary education rates were the highest among people aged 60 +. In addition, many middle-aged people (i.e., age groups 30–39 and 40–59) obtained higher education degrees. In contrast, most unhoused people (4.4 % of the sample) did not finish primary school.

More than half of the respondents classified themselves into the average income group. The high-income class comprised mainly highly educated middle-aged people, whereas most elderly and almost all homeless people (i.e., those generally considered vulnerable) classified themselves as low-income.

If we compare the socioeconomic characteristics of newcomers (i.e., those who moved into the neighborhoods in the past 10 years) and long-term residents (i.e., those living in the neighborhoods for more than 10 years), we can identify significant differences:

- The majority (67.8 %) of newcomers belong to the age group of 18–39, and 58.7 % of them are men.
- 65.3 % of the neighborhood population had a higher education degree, and 72 % of the high-income people were 18–39 years old (most newcomers).
- 42.1 % of those living in the neighborhood for over 10 years are 60 or older, and 52.7 % are women.

These descriptive data show that the socioeconomic composition of residents has been changing: those who have recently moved to these inner-city neighborhoods are mostly highly educated, better-off young people, whereas long-term residents are mainly older, less educated, and low-income. This provides some evidence that the investigated inner-city neighborhoods have been affected by population change and gentrification in the last decade. However, aligned with the findings of Kubeš and Kovács (2020), we believe that due to the dominance of owner-occupation in the housing market, the influx of gentrifiers is not so abrupt in Budapest as in other US (Sutton, 2020; Zuk et al., 2018) and Western European inner cities (Freeman et al., 2016; Prêteceille, 2007); the comingling of socioeconomic (and lifestyle) groups can thus be sustained long-term.

3. Results

3.1. Respondents' motivations for using the parks

Results show that among up to six available options, respondents' primary motivations for visiting inner-city block parks were to walk in the park and relax (e.g., to read a book on a bench) (Table 2).

In 16 cases, the chi-square test indicated a significant correlation between the main goals of visiting the park and the socioeconomic profile of visitors (Table 3).

We found that for people aged 40–59—and particularly over 60—the main goals of visiting the parks were to take a walk (26.6 % and 44.6 % of the respondents indicated this answer, respectively) and to relax (39.1 % and 44 %). Typical patterns were also present in the motivation of younger people: for people 30–39 years old, the main goal for visiting the park was to take children to the playgrounds (36.6 %), and for people 18–29, it was the possibility of meeting up with friends (31.1 %). In addition, dog walking (18 %) and sports activities (13.8 %) were motivating for the latter group.

Our results indicate differences in motivations for park use according to sex, showing typical variances in domestic or leisure behavior patterns (Colley et al. 2022). Although relaxation topped the ranking for men and women, it seemed more important as a driver of park use for men than women (35.5 % and 27.4 %, respectively). Female

Table 2

Main reasons for visiting the inner-city block parks.

	Walking	Relaxation	Take children to playgrounds	Meeting up with friends	Dog walking	Sport activity
Responses						
Yes	31.7 %	31.7 %	17.8 %	16.2 %	11.8 %	7.8 %
No	68.3 %	68.3 %	82.2 %	83.8 %	88.2 %	92.2 %
Total	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

Table 3

Respondents' main goals for visiting the parks by age, sex, income, and based on the time being resident in the neighborhood.

	Walking	Relaxation	Take children to playgrounds	Meeting up with friends	Dog walking	Sport activity
Age category						
18–29	24.6 %	23.4 %	10.2 %	31.1 %	18.0 %	13.8 %
30–39	28.0 %	20.6 %	36.6 %	16.6 %	16.0 %	8.6 %
40–59	29.6 %	39.1 %	16.6 %	11.8 %	5.9 %	6.5 %
60 and above	44.6 %	44.0 %	7.1 %	5.4 %	7.1 %	2.4 %
p-value*	0.000	0.000	0.000	0.000	0.000	0.001
Sex						
Female		27.4 %	24.0 %		15.6 %	4.4 %
Male		35.5 %	12.3 %		8.4 %	10.9 %
p-value*		0.015	0.000		0.003	0.001
Income class						
Low-income		44.1 %	11.2 %	9.3 %		3.7 %
Average income		29.4 %	18.6 %	16.7 %		7.5 %
High-income		22.0 %	22.7 %	23.5 %		11.4 %
p-value*		0.000	0.027	0.004		0.044
Time of being resident in the neighborhood (within 1000 m radius of the park)						
0–10 years	26.5 %					11.7 %
11 or more years	37.2 %					3.8 %
p-value*	0.003					0.000

* p-value based on chi-square test

respondents indicated taking children to playgrounds as the second main reason (24.0 %); in contrast, sports activities were found as men's second most frequent reason (10.9 %). Dog walking was also a more common factor for park use among women than men (15.6 vs 8.4 %).

For low-income people, relaxation dominated the goals of park visitation (44.1 %). Conversely, relaxation, outdoor activities with children, and sports were almost equally important goals for high-income people (22.0, 22.7, and 23.5 %, respectively). For higher-income groups, sports activities gained particular importance. Regarding age and income level, older people generally classified themselves as low-income, while younger people reported belonging to the average- and high-income classes.

Finally, motivations for park visits also differed between long-term residents and newcomers. Participating in sports was three times more important for newcomers than those who had lived in the neighborhood for over 10 years. Long-term residents tended to indicate "walking" as the primary purpose.

3.2. Frequency of park visits

More than half of the respondents (58.2 %) visited the parks frequently (daily or more than once a week), 20.6 % visited the parks only once per week or every second week, and 21.2 % used the parks only occasionally. In addition, we found three significant correlations based on the frequency of park visits (Table 4).

Older people claimed to visit the park more frequently than younger people. Although 77.5 % of respondents above 60 reported visiting the park more than once a week, only 37.7 % of those 18–29 reported the same. Moreover, 79.3 % of those living near the parks (i.e., within 300 m) visited the parks daily or more than once a week. We also found a strong relationship between the frequency of park visits and income level: low-income people visited the parks more frequently than average and high-income people.

Investigating the transportation modes used by the respondents to access the parks, we can conclude that 70.9 % of the respondents came on foot and 16.6 % by public transportation. In contrast, the

Table 4

Frequency of park visits by age and income, and based on the distance of respondents' homes from the parks.

		Daily / More than once in a week	Once in a week / Biweekly	Not regularly	p-value *
Age category					
18–29	37,7 %	22,2 %	40,1 %	0.000	
30–39	57,1 %	21,7 %	21,1 %		
40–59	60,4 %	23,7 %	16,0 %		
60 and above	77,5 %	14,8 %	7,7 %		
Income class					
Low-income	75,2 %	14,3 %	10,6 %	0.000	
Average income	53,5 %	21,6 %	24,9 %		
High-income	50,0 %	25,8 %	24,2 %		
Park's distance from the respondent's home					
0–300 m	79,3 %	16,7 %	4,1 %	0.002	
301–600 m	66,3 %	26,3 %	7,5 %		
600–1000 m	57,6 %	31,5 %	10,9 %		

* p-value based on chi-square test

respondents' car and bicycle use shares were 6.8 % and 5.6 %, respectively.

3.3. Comparison of catchment areas defined by walking distance and the postal codes of respondents

The accessibility of urban green spaces is often measured by applying fixed walking distances (Csomós et al., 2020; Reyes et al., 2014). Urban green spaces' catchment areas can be defined based on fixed walking distance ranges (e.g., 300 m, 500 m, 1000 m) with isodistance mapping. Because isodistance maps are easily produced, this procedure is ubiquitous in urban and transportation planning to map the accessibility of objects (Cullinan et al., 2008; Dong et al., 2006). During the survey, we recorded the postal codes of visitors' homes that could be allocated to postal districts. By doing so, we could compare park catchment areas

defined by isodistance mapping with postal districts containing park visitors' homes—in other words, we could compare the hypothetical catchment areas with the actual ones.

As Fig. 2 shows, parks in inner-city districts were visited primarily by people who live in the districts in which they are located. Although some parks' isodistance catchment areas stretched over the districts' boundaries, people from neighboring districts did not often visit off-district parks. In contrast, a park with a favorable geographical location and high accessibility (e.g., Kerekerdő Park) could attract people from distant parts of the district.

Furthermore, Fig. 2 confirms that major roads that divide the urban fabric, such as the Üllői street between Districts VIII and IX, appear to be substantial physical barriers to people's movement, hampering them from accessing neighboring parks. As such, if a park is located on the edge of District "A" but a major road separates that district from the adjacent District "B," then the park in District "A," regardless of its seemingly optimal location for all people in its vicinity, will most likely not be visited by residents from District "B."

3.4. Visitors' satisfaction with the parks and demands for future developments

The level of overall satisfaction of respondents with the parks—specifically with the green surfaces and vegetation, the amenities of the parks, and the security—were relatively high (Table 5). Respondents were most satisfied with the parks' green surfaces and vegetation (satisfied and very satisfied combined was 87.2 %), whereas the overall satisfaction with the parks measured slightly under that value (81.2 %). The parks' amenities were also highly valued (77.8 %), although to a lesser degree than in the previous cases. Respondents were relatively less satisfied with the parks' security (the share of those who reported satisfaction with this factor reached only 71.2 %). This was an unexpected finding considering the security measures in all four parks: they are fenced, equipped with CCTV cameras, patrolled by security guards during the day, and closed at night.

In this regard, the survey revealed three noteworthy findings (Table 6). First, as the dissatisfaction rate for women and men was 11.2 % and 6.5 %, respectively, male respondents were more satisfied with

the level of security in the parks than female ones. Second, people with primary education were less satisfied with the parks' security (14.7 %), while most people with secondary and higher education felt safe in the parks (73.3 % and 72.0 %, respectively). Third, the sharpest differences regarding the level of satisfaction with security were found across income groups. Low-income people tended to be the least satisfied with the parks' security (15.6 %); the dissatisfaction rate decreased among respondents with average (8.1 %) and high incomes (2.3 %).

In addition, the multiple regression model demonstrated that people's overall satisfaction with the parks was primarily influenced by how secure they felt in the parks, followed by the quality of the park infrastructure and amenities and the quality of the greenery (Appendix 3).

Respondents' demands for new facilities and willingness to contribute to the maintenance of parks were also captured. Regarding maintenance, 59.1 % of the respondents declared they would not be willing to contribute to park maintenance by any means, 20.8 % would instead participate in voluntary works (e.g., park clean up), and 20.2 % would devote money to park maintenance. We found a significant correlation between respondents' willingness to contribute to park maintenance and respondents' age and the length of living in the neighborhood (Table 7).

Older people willing to contribute to park maintenance would preferentially donate money to maintenance, whereas younger people would participate in voluntary work instead. People aged 30–39, for whom the greatest motivation for visiting parks is to take children to playgrounds, were the most motivated to participate in voluntary work in park maintenance. Finally, newcomers showed greater willingness to contribute with work to park maintenance than long-term residents.

Table 8 summarizes respondents' desires for future developments. As shown in the table, improving security was almost twice as important for long-term residents as for newcomers (21.2 vs. 11.8 %). This finding is surprising, mainly since the parks have been entirely regenerated recently, including security improvements. Therefore, we assume that the attitude of long-term residents regarding safety originated from their earlier experiences rather than the current situation; reviews on social media platforms like Google Maps reinforce this assumption.

For newcomers, the development of parks' vegetation (e.g., trees and flowers) and sport facilities (e.g., outdoor gyms) was more important

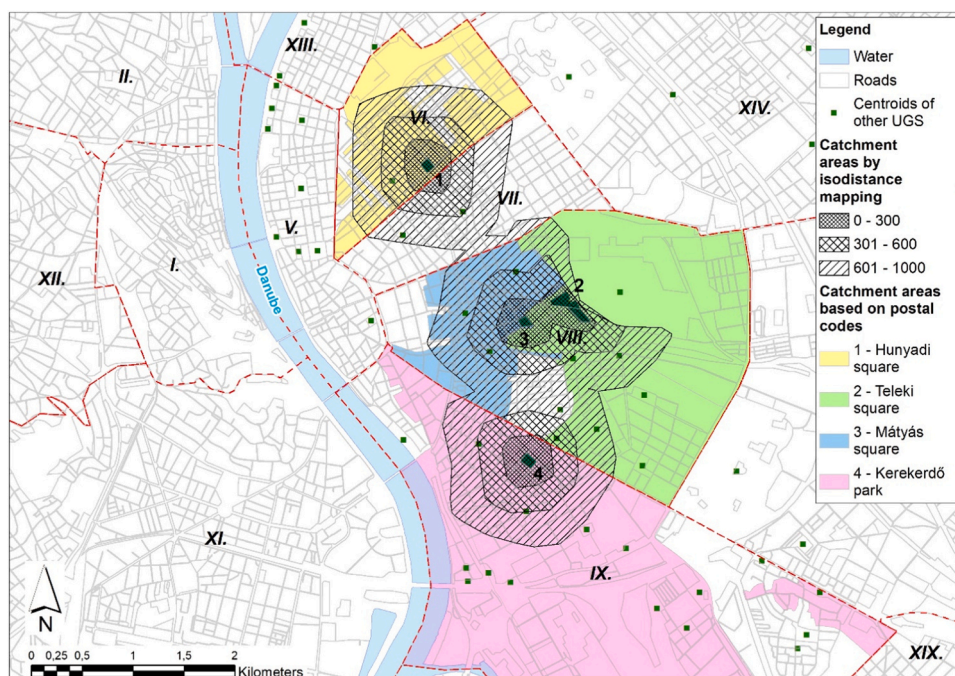


Fig. 2. Comparing catchment areas defined by isodistance mapping with postal districts containing park visitors' homes.

Table 5
Respondents' satisfaction with different features of the parks.

	Overall satisfaction with parks	Green surfaces and vegetation	Amenities of the park	Security
Very unsatisfied	0.9 %	0.3 %	1.2 %	3.0 %
Unsatisfied	2.6 %	2.4 %	2.3 %	5.8 %
Neutral	15.3 %	10.1 %	18.6 %	20.1 %
Satisfied	37.6 %	26.2 %	37.4 %	32.1 %
Very satisfied	43.6 %	61.0 %	40.4 %	39.1 %
Total	100.0 %	100.0 %	100.0 %	100.0 %

Table 6
Respondents' perceptions of parks' security by education level, sex, and income.

		Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
Education level	Primary school	4,2 %	10,5 %	21,1 %	35,8 %	28,4 %
	Secondary school	4,3 %	2,2 %	20,3 %	30,5 %	42,8 %
Sex	Higher education	0,4 %	8,2 %	19,3 %	32,9 %	39,1 %
	Female	2,8 %	8,4 %	19,1 %	34,4 %	35,3 %
Income class	Male	3,1 %	3,4 %	21,0 %	30,0 %	42,6 %
	Low-income	8,1 %	7,5 %	18,8 %	32,5 %	33,1 %
	Average income	1,4 %	6,7 %	19,4 %	31,7 %	40,8 %
	High-income	0,8 %	1,5 %	24,4 %	32,8 %	40,5 %

Table 7
Respondents' willingness to contribute to park maintenance.

		Willing to contribute with money	Willing to contribute with work	Not willing to contribute at all
Age category	18–29	13,0 %	24,7 %	62,3 %
	30–39	18,3 %	26,6 %	55,0 %
	40–59	20,9 %	20,9 %	58,3 %
	60 and above	28,3 %	10,8 %	60,8 %
Time of being resident in the neighborhood (within 1000 m radius of the park)	0–10 years	20,6 %	26,7 %	52,7 %
	11 or more years	20,6 %	15,3 %	64,1 %

than it was for long-term residents (14.7 vs. 9.0 %, and 8.1 vs. 1.5 %). In contrast, the development of conventional facilities (e.g., public toilets and drinking fountains) was more desired by long-term residents (39.9 vs. 46.51 %).

The study also found that respondents' demands for future developments aligned with their primary reasons for visiting the parks. People 30–39 years old and people with higher education found the development of playgrounds and equipment for children the most important. Young people aged 18–29 desired improved sports facilities and equipment. Young people and people with higher education desired the development of facilities for dogs and dog walking trails.

Because the influx of young people (i.e., gentrification) has been accelerating in the neighborhoods where the parks are located, we assume that visitors' demands for park ecosystem services will change and increase the demand for advanced park amenities (e.g., smart park furniture, free Wi-Fi, and electric scooter/bicycle chargers).

Table 8
Amenities and features needed to be developed according to the respondents.

		Accessibility	Additional amenities	Playground and equipment for children	Facilities for dogs	Environment	Sports facilities and equipment	Security	No development is required
Age category	18–29	2.97 %	41.58 %	2.97 %	4.95 %	11.88 %	9.90 %	14.36 %	11.39 %
	30–39	5.02 %	37.90 %	15.53 %	1.37 %	13.70 %	2.74 %	15.53 %	8.22 %
	40–59	1.90 %	46.67 %	7.62 %	0.95 %	10.95 %	4.76 %	16.19 %	10.95 %
	60 and above	0.98 %	50.00 %	6.86 %	1.47 %	9.31 %	1.96 %	20.59 %	8.82 %
Sex	Female	2.68 %	41.61 %	9.49 %	3.16 %	12.17 %	3.16 %	20.19 %	7.54 %
	Male	2.81 %	46.14 %	7.26 %	1.17 %	11.24 %	6.32 %	13.11 %	11.94 %
Income class	Low-income	2.08 %	46.35 %	5.73 %	1.04 %	13.02 %	5.21 %	18.23 %	8.33 %
	Middle income	2.65 %	42.48 %	8.19 %	2.43 %	11.73 %	4.42 %	16.37 %	11.73 %
	High-income	4.07 %	46.51 %	11.05 %	2.33 %	9.88 %	4.65 %	13.95 %	7.56 %
Education level	Primary education	0.95 %	45.71 %	10.48 %	0.95 %	9.52 %	6.67 %	16.19 %	9.52 %
	Secondary education	3.34 %	45.58 %	6.92 %	1.43 %	11.22 %	3.82 %	16.95 %	10.74 %
	Higher education	2.67 %	41.67 %	10.00 %	3.67 %	13.00 %	5.00 %	15.67 %	8.33 %
Time of being resident in the neighborhood (within 1000 m radius of the park)	0–10 years	3.67 %	39.90 %	9.19 %	2.62 %	14.70 %	8.14 %	11.81 %	9.97 %
	11 or more years	2.33 %	46.51 %	8.01 %	1.81 %	9.04 %	1.55 %	21.19 %	9.56 %

4. Discussion

Parallel with accelerating urbanization, cities and their neighborhoods have been experiencing an increased need for green space developments (Anguluri and Narayanan, 2017; WHO, 2017). As a result, researchers and professional organizations have extensively documented the benefits of urban green spaces for city dwellers (Bedimo-Rung et al., 2005; Berman et al., 2008; Cohen et al., 2007; Hartig et al., 2003; Hedblom et al., 2019; Kaczynski and Henderson, 2007; Wolch et al., 2014). However, it has also been demonstrated that the shortage of urban green spaces is the most dramatic in inner-city areas characterized by high population density and built-up areas (Haaland and van den Bosch, 2015; Liu and Wang, 2021; Peschardt et al., 2012).

Considering the average size of lots generally available in densely built inner-city districts, the creation of block and pocket parks seems the most plausible option for municipal governments worldwide to develop urban green spaces (see, for example, Lin et al., 2017; Nordh and Østby, 2013). To support the efforts of urban planners and city officials, we assessed park visitors' satisfaction with some recently revitalized block parks in Budapest and mapped their demands for future developments. In addition, we sought to determine how residents thought about participating in voluntary actions to support the municipal government in park maintenance. Lessons learned from the case of Budapest could provide helpful information for other cities where urban green spaces are scarce in densely built inner-urban areas. Below, we summarize and discuss our main findings:

1) Inner-city block parks are most frequently visited by people living in the vicinity of the parks (i.e., a 300 m radius); however, based on the postal code analysis of respondents' homes, we also found that small urban green spaces with good transport connections may attract people from more than 1000 m of distance. Thus, the demand of people for ecosystem services living in the narrower surroundings of pocket or block parks must be investigated, and the opinion of people living further away must be considered.

Accessibility is vital for most people when deciding which park to visit. Since most people approach inner-city parks on foot and, to a lesser extent, by public transport, walkability, the configuration of the street network, and the location of public transportation hubs fundamentally determine people's decisions regarding park visits. As far as accessibility is concerned, we found that major urban roads with heavy traffic, primarily those with tramway tracks, represent robust physical barriers to people who intend to visit the parks. This phenomenon was also described in a case study on Halle (Barber et al., 2021).

Furthermore, the actual catchment areas of some block parks encompass nearly the entire district, even if the district contains several other urban green spaces. This finding corroborates two assumptions: (a) small urban green spaces can intensely attract distant people if they are located at the focal points of transport networks, and (b) inner-city block parks are frequently used not only by people living near the parks but also by people working, studying, shopping, and doing any daily activities in the parks' vicinity. In addition, because well-accessible inner-city block parks are often visited by people who live further away from the parks, their demand for services, such as public toilets and drinking fountains, must also be considered.

2) Most of the respondents in the survey expressed high satisfaction with the quality of green surfaces and vegetation, as well as the quality of the infrastructure and additional amenities. However, if we compare visitors' satisfaction with the quality of green surfaces and other amenities, we can realize that people were less satisfied with the latter. Instead, visitors considered the development of infrastructural elements and amenities more important than any other features of the parks. Based on the higher quality expectations for cultural ecosystem services than for other ones, we can conclude

that users consider inner-city block or pocket parks as important scenes for social interactions (see, for example, Peters et al., 2010). We also found that people's overall satisfaction with the parks is influenced by park security in the first place, followed by the quality of the infrastructure and amenities, and lastly, the quality of greenery.

3) In the survey, we found that factors like age, sex, education, and income level seriously affect how safe people feel in parks. For example, younger (i.e., those aged 18–39) and primarily male visitors with higher education and higher income felt much safer in the parks than older people, women, less educated, and low-income visitors. This finding, on the one hand, suggests that measures should be taken to increase park safety for these groups; however, on the other hand, a deeper investigation is needed to reveal why certain groups of people consider the parks more unsafe.

According to our assumption, older people's perception of safety is influenced by their earlier experiences gained before the revitalization of the parks and the renewal of the neighborhoods. In the 1990 s, the parks used to be among the districts' least desirable and safe places, and despite the large-scale urban renewal programs, the dissatisfaction of older people towards the parks has remained intact. Social media feedback also confirms this on Google Maps because the earliest park reviews regarding quality and safety are harsher than the most recent ones.

However, there might be a slightly more sophisticated reason the safety perception differs across socioeconomic groups. Ample research documents that better-off and highly educated people, especially younger men, are more self-confident in their daily lives (Exley and Kessler, 2019; Möwisch et al., 2021; Tong et al., 2021): they feel safer at work when driving, shopping, doing sports, and visiting parks. In contrast, most vulnerable people (e.g., older adults, women, less educated, and low-income people) tend to feel unsafe in parks, just like they feel unsafe in general. Consequently, people's perception of parks' safety does not necessarily coincide with their actual level of security but, instead, the outcome of their socioeconomic circumstances.

4) Finally, we found that most respondents were unwilling to contribute to the parks' maintenance because they regarded it as the duty of the municipal government. However, due to some recent events affecting the budget of municipal governments (e.g., the fight against the COVID-19 pandemic and the recent energy crisis), it has become increasingly challenging to provide urban services at the same level of quality as previously implemented. Therefore, financing the maintenance of urban green spaces has also become critical (Fulton, 2012; McCormick, 2020), and future initiatives of the local governments should increasingly focus on involving people in park maintenance (e.g., by cleaning up the parks), especially in densely built neighborhoods, where urban parks are spectacular features of the urban landscape. Furthermore, as concepts like eco-consciousness and climate protection have increasingly become important for young people (i.e., those classified as Millennials or belonging to Generation Z), some residents can probably be more easily motivated to participate in volunteer work. Therefore, if a local government wants to organize a "park cleanup event," the city administration should assess the potential participants, and the messages should be delivered through the most effective channels (e.g., social media platforms).

5. Conclusions

Inadequate or insufficient urban green spaces pose a significant problem in Budapest and numerous other cities worldwide with high populations and building densities. Because of the limited size of available land in the inner-city, municipal governments can only think of creating small urban green spaces (e.g., pocket and block parks), even while the role of small urban parks and the ecosystem services they provide will likely increase worldwide. In light of this need to develop

better green spaces, this paper explores the attitudes and perceptions of visitors of inner-city block parks in Budapest. Our survey results show that people's demands for such amenities—especially for cultural ecosystem services—are exceptionally high, varying across age, sex, and socioeconomic groups. Therefore, improving the availability and accessibility of inner-city urban green spaces must be at the forefront of contemporary urban policymaking and planning. The study also demonstrated that highly accessible small urban parks with favorable transport locations attract many distant people, suggesting that the definition of catchment areas should move beyond isochrone/isodistance mapping.

Limitations of our study include that we surveyed only four parks representing a small share of the parks in Budapest. However, we collected an extensive enough number of questionnaires to draw reliable conclusions. Furthermore, people's perceptions of small urban parks might differ in cities with higher densities or socioeconomic and cultural backgrounds. Therefore, we should survey other European cities in follow-up research to reinforce our results.

Appendix 1. Summary statistics of the population living in selected inner-city districts

	District			Budapest
	VI	VIII	IX	
Population	38,799	76,653	60,180	1750,216
Population density (people per sq. km)	16,302.1	11,190.2	4802.9	5932.9
Population changes between 2005 and 2019	-3239.0	-3464.0	326.0	52,110.0
Share of people between the ages of 18 and 29 years (%)	14.7	15.0	13.9	17.0
Changes in the share of people between the ages of 18 and 29 years	-2.8	-1.7	-2.8	-4.1
Share of people between the ages of 30 and 39 years (%)	19.9	18.1	18.6	14.9
Changes in the share of people between the ages of 30 and 39 years	3.3	1.4	1.9	-1.2
Share of people between the ages of 40 and 49 years (%)	17.7	17.4	17.5	17.8
Changes in the share of people between the ages of 40 and 49 years	5.6	4.0	4.9	6.0
Share of people between the ages of 50 and 59 years (%)	11.9	13.6	12.2	12.2
Changes in the share of people between the ages of 50 and 59 years	-4.4	-2.2	-2.7	-3.8
Share of people above the age of 60 years (%)	24.1	23.3	24.3	27.3
Changes in the share of people above the age of 60 years	-0.9	1.4	-0.1	2.8
Share of people with higher education degree (% , 2011)	35.7	25.3	33.5	29.1
Per capita income (HUF, 2019)	4117,861	3275,873	4207,818	4048,622
Changes of the per capita income between 2005 and 2019 (% ,)	61.4	52.1	78.0	58.2

Appendix 2. Survey data and the main amenities of the selected parks

	Hunyadi square	Teleki László square	Mátyás square	Kerekerdő Park
District	VI	VIII	VIII	IX
Number of respondents	174	171	173	163
Park size (sq. m)	6870.9	27,012.1	6261.9	9295.2
Number of fountains	1	0	1	0
Trees in the park	yes	yes	yes	yes
Benches	yes	yes	yes	yes
Playground	yes	yes	yes	yes
Sporting field	yes	yes	yes	yes
Dog walking trails	no	yes	no	no
Buffet/Ice cream parlor	yes	yes	no	no
Drinking fountain	2	1	1	2
Public toilet	no	yes	yes	no
Encircled by fences	yes	yes	yes	yes
Closed for the night	yes	yes	yes	yes

Source: own survey conducted from July to August 2021

Appendix 3. Multiple regression demonstrating potential factors influencing people's satisfaction with the parks

CRedit authorship contribution statement

György, Csomós: Conceptualization, Methodology, Writing - Original Draft. **Jenő Zsolt, Farkas:** Conceptualization, Methodology, Formal analysis, Writing - Original Draft, Visualization. **Balázs, Szabó:** Investigation, Resources. **Zoltán, Bertus:** Investigation, Resources. **Zoltán, Kovács:** Conceptualization, Writing - Review & Editing.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Acknowledgements

This research was supported by the Hungarian Scientific Research Fund (OTKA) Grant Agreement No. K135546, and the National Research, Development and Innovation Fund of the Ministry of Innovation and Technology, Hungary grant number NKFIH-1279-2/2020 and TKP2021-NVA-09.

Variable	Coefficient	Standardized coefficient	Significance	VIF
(Constant)	1381		0000	
Perception of green quality	0228	0212	0000	1373
Perception of infrastructure quality	0241	0248	0000	1361
Perception of park security	0277	0338	0000	1267
Gender	-0006	-0004	0904	1008
Age	0004	0086	0008	1140
Educational level	-0125	-0099	0004	1244
Income	-0093	-0074	0035	1308
R	0641	-	-	-
R square	0411	-	-	-
Adjusted R square	0404	-	-	-
Mean VIF	-	-	-	1243

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