

Review of the Relationship Between Urban Greenspace Accessibility and Human Well-being

Wenqing Liang^{1, a}

¹College of Economics, Jinan University, Guangzhou, 510632, China

^azoeliang96@outlook.com

Abstract

Urban green space has been widely concerned by people from all walks of life because of its potential benefits for the physical and mental health of the urban population. Green space has economic, ecological and social functions. Its ecological function is that green space can absorb urban air pollutants, improve air quality, and improve the living environment; social function is reflected in the urban green space provides a place for relaxation and leisure, ease the mental pressure of residents, reduce the risk of public illness, promote physical and mental health. Therefore, it is of great significance to public well-being and sustainable urban development. This article summarizes the commonly used estimation methods and data sources of green space accessibility, combs the relationship between urban green space accessibility, residents' physical and mental health and social equity, and prospects for future research directions: enrich more research on the types of green space and add more research on public welfare.

Keywords

Urban green space; Accessibility; Human well-being; Environmental justice.

1. INTRODUCTION

The development direction of cities in the world today is to provide residents with a more comfortable living environment, a fairer social environment, and a greener natural environment. In other words, urban green space is an indispensable and important part of building a healthy city and a livable city. In Western countries, it has been repeatedly emphasized that the theme of urban planning is inseparable from the color of "green". For example, the 2030 London plan emphasizes the concepts of people-oriented, fairness, prosperity, convenience and green development; the 2030 New York plan requires more construction. Greener and better cities.

In China, with the rapid economic development and the increase in per capita income, the main contradiction in society is the contradiction between the people's growing need for a better life and the unbalanced and inadequate development. "To the "quality type", looking forward to more comfortable living conditions and a more beautiful living environment. This means that green spaces in cities need to be improved. On the one hand, urban green space can not only improve air quality, reduce the urban heat island effect, increase entertainment venues, and enhance aesthetic value; on the other hand, it can also reduce residents' mental fatigue, relieve life pressure, and enhance residents' subjective well-being [1]–[3].

Urban green space is of positive significance to the improvement of public well-being and the sustainable development of the city. The accessibility of urban green space largely determines the impact of green space on subjective well-being. It is a bridge and channel that connects green space to public well-being. In view of this, it is necessary for this article to sort out and prospect the relationship between urban green space accessibility and public welfare, to help

us understand the importance of such research more comprehensively, and to provide basis and reference for urban planning and construction.

2. MEASURING THE ACCESSIBILITY OF URBAN GREEN SPACE

2.1. Estimation Method of Urban Green Space Accessibility

The accessibility of urban green space refers to the degree of difficulty for residents to go to urban green space. The concept of "accessibility" has become a central concept in physical planning and is widely regarded as a useful tool for policy evaluation. According to the previous literature, the methods to measure the accessibility of green space mainly include the following four (Table 1): administrative or statistical unit calculation method, minimum proximity distance method, service area method and gravity model method.

Table 1. Common estimation methods of urban greenspace accessibility

Name	Measure	Advantage	Disadvantage
Administrative or statistical unit calculation method	For each administrative unit, such as districts, counties, streets, etc., calculate the green area or number of green areas in the unit.	The method is simple and easy.	The administrative boundary cannot prevent residents from going to other green spaces, and cannot simulate the actual situation of residents visiting green spaces.
Minimum Proximity Distance Method	The distance or travel time from the place of residence to the nearest green area. General estimation methods include straight-line distance method, cumulative resistance method, and network analysis method.	The straight-line distance method is simple and easy to implement; the cumulative resistance method takes into account the different degrees of obstruction to residents by different land use types; the network analysis method is closer to the actual distance from the residents to the green space, and the simulation effect is good.	The distance obtained by the straight-line distance method is usually smaller than the distance from the residents to the green space in the actual situation; the cumulative resistance method needs to combine land use data and the result is subjective; the network analysis method requires detailed data, large calculation amount, and high difficulty.
Service Area Law	Measured by the area or quantity of green space that can be reached within a certain time or distance, the buffer zone method is more common.	In addition to considering the distance, the area and quantity of accessible green spaces are also added, which more comprehensively reflects the accessibility of green spaces.	Limited by the distance or time threshold set in the research, it is difficult to make a horizontal comparison.
Gravity Model Method	It is assumed that the residents' willingness or probability of visiting green space is positively correlated with the attractiveness of the green space and residents' demand, and negatively correlated with the resistance (usually the distance) between the residential area and the green space.	On the basis of the distance and quantity of green space, this method also takes into account the influence of green space attractiveness and residents' demand on green space visits, which helps to evaluate residents' behavior of visiting green space.	There are more factors to be discussed and more data is needed.

2.2. Data Sources of Urban Green Space Accessibility

The data support required for urban green space accessibility is generally divided into two categories: green space distribution data and urban residents data.

There are generally two types of green space distribution data. The first is urban green space data provided by the government and other relevant departments. For example, the Environmental Protection Agency provides detailed information on the location of urban parks, including the number, size, and other detailed information of the park; the other is Spatial distribution data of urban green space obtained from remote sensing images.

There are generally two sources for urban residents' data. The first is derived from census data. The advantages of census data are rich content, better data continuity, and strong comparability. The disadvantage is that the statistical unit area of the data is large and it is difficult to express spatial differences on small scales. Qualitative. The second type of data is to obtain personal information of residents through questionnaire surveys. The advantage is that the questionnaire can be designed as needed to be close to the research content. The disadvantage is that the sample may not be sufficient, the cost is high, and the collection time is long, and different studies may differ due to the design of the questionnaire. It is difficult to compare.

3. RESEARCH ON GREEN SPACE ACCESSIBILITY AND PUBLIC WELFARE

3.1. Urban Green Space Accessibility and Residents' Physical and Mental Health

First of all, urban green space is beneficial to the health of residents. For urban residents, urban green space has aesthetic advantages, which can provide residents with the opportunity to appreciate the green landscape. At the same time, research has found that walking, jogging, cycling, fitness and other physical exercises in urban green spaces can effectively improve their physical condition, To promote physical health and help residents improve their satisfaction with the living environment [4]. A large number of studies have shown that the green space accessibility of residential areas is related to the frequency of residents' physical exercise [5]–[7]. For example, the residents' exercise level is positively correlated with the total green area near the residence [8]–[9], the number of green spaces [10], and the area of the nearest green space [11], and is negatively correlated with the distance from the residence to the nearest green space. Related [12].

Secondly, urban green space has a significant positive impact on the mental health of residents [13]. The epidemiological survey report shows that urban green space has a positive correlation with mental health [14]. Neighborhood green can improve mental health by reducing the pathophysiological processes that lead to nerve inflammation, cerebrovascular damage and neurodegeneration [15]. The green space around the residential area is considered to promote sports activities and social connections between neighbors, thereby benefiting mental health [16]. Research in the environmental psychology literature proves that entering the park can bring many well-being and health benefits. At the same time, people usually think that the lack of parks is a lack of opportunities for social and sports activities, which is related to people's well-being and health risks [17]. Studies have also confirmed that urban green space is a psychological recovery resource, which shows that it can reduce psychological pressure and relieve tension and anxiety. In addition, some scholars have found that the green space accessibility and biodiversity of residential areas can effectively promote residents to reduce stress, increase happiness, and improve subjective well-being.

3.2. Urban Green Space Accessibility and Social Fairness and Justice

A large number of studies have shown that the distribution of green space in cities is quite different. First, there are obvious differences in the spatial distribution of urban green space between different regions. Some scholars have found that the accessibility of urban suburban green space is better than that of urban areas. A study in Beijing found that the area of residents who can reach the park within 1 km The proportion decreases from the city center to the periphery [18].

The uneven distribution of urban green space is not only reflected in the spatial distribution, but also in the socio-economic level of residents who enjoy urban green space. In the past few decades, China has experienced rapid but uneven urban development. Although it has brought huge benefits to its citizens, it has also created many new problems in urban development. Insufficient supply of urban green space and uneven distribution have caused some mega-cities to face long-term environmental justice loopholes. The market power of the development of green space for private services may seriously affect the fair distribution of urban green society. Therefore, from the perspective of social equity, most studies believe that the right to enjoy urban green space is often highly stratified according to income, race, racial characteristics, age, gender, disability, lack of political power, and other axes [1]. Studies abroad have shown that compared with white and wealthy social groups, urban poor and minority ethnic groups have fewer opportunities to enter the park. Regarding the fairness of park quality, some scholars have found that fragile communities often have poor quality parks [3]. Chinese scholars have found that in Guangzhou, the higher the social and economic level of residents, that is, the higher their personal income, the higher their social status, and the more green space they can enjoy.

4. SUMMARY AND OUTLOOK

China's rapid urbanization process has brought many challenges, especially as the scale of cities expands, the problem of insufficient supply of urban green space has intensified, and the uneven distribution of urban green space has become more and more intense. Moreover, due to the different quality, design and geographical location of urban green space, this difference will make the use of different groups of people lack of fairness, which is not conducive to the overall improvement of urban public welfare and the construction of sustainable cities. Studies have shown that urban green space has an important and positive effect on the physical and mental health of residents. Therefore, improving the lack of urban green space and uneven distribution is crucial to the sustainable development of the city.

At present, scholars at home and abroad have conducted a large number of related studies to deeply analyze the relationship between urban green space and public welfare. First of all, according to different research needs, the estimation method of green space accessibility is continuously updated, the measurement method is expanded, and more factors are included to make the estimation method more diversified and the estimation result more accurate. Secondly, for different research content, data sources are also differentiated. Third, in the research on the accessibility of urban green space and public welfare, it has been found that research has confirmed that urban green space not only improves the physical condition of residents, but also relieves residents' psychological pressure and promotes mental health. From the perspective of green space accessibility and environmental fairness, the spatial distribution of urban green space is indeed quite different in different regions, resulting in lower green space accessibility for residents with low socio-economic levels. Therefore, on the basis of combing the existing research, this article puts forward the following suggestions for future research:

First, the effects of different types of green spaces on public welfare should be widely considered. Current research mainly focuses on the role of parks in improving public well-being,

but there are few studies on community green spaces and private green spaces, such as golf courses and community flower gardens.

Second, the scope of public welfare can be broadened. Research at this stage is mainly focused on the effect on the physical and mental health of residents, but public welfare should not be limited to the simple perception of the human body, as well as interpersonal relationships, psychological security, social identity, and so on.

Third, we should pay attention to the topic of environmental justice to ensure the marginalized population's demand for urban green space. When planning urban green space, the government must clearly point out the strategy of giving priority to disadvantaged groups.

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