

The Environmental Survey of Sports Parks Based on the Statistical Method of Data under the Concept of Green Development

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Abstract. As an important part of urban public space, the environmental condition of sports parks is directly related to the health and quality of life of citizens. The study aims to conduct an in-depth investigation and research on the environment of sports parks under the concept of green development through the data statistics method. Through monitoring and analyzing key indicators such as air quality, noise level, green coverage, water use, etc., a comprehensive understanding of the environmental conditions of sports parks was achieved. The results of the study show that the standard deviation of all the factors is less than 1.33, and the expected value of the mean deviation of nine factors is higher than the satisfaction level, while the expected value of only three factors is lower than the satisfaction level. There is a need for the park to be upgraded and remodeled in several areas. The results of the study will provide a scientific basis for the green development of sports parks and promote the sustainable development of parks. Meanwhile, the study will also help to raise the public's awareness and participation in environmental protection and promote the overall improvement of the urban environment.

Keywords: green development; data statistics method; sports park; environmental survey

1 Introduction

With people's attention to the green ecological environment and the pursuit of a healthy lifestyle, sports parks play an increasingly important role as an important place for urban leisure activities [1]. The quality of sports park environment has an important impact on people's health and quality of life. Under the leadership of the concept of green development, how to investigate and study the environment of sports parks through scientific data and statistical methods to further optimize and improve its environmental quality has become an urgent topic [2]. As a green space in the city, sports park is not only a place for people to exercise and recreational activities, but also an important part of the urban ecosystem. The environmental quality of sports parks not only directly affects the experience and health of park users, but also relates to the overall quality of the urban environment and the quality of life of residents [3]. Therefore, the investigation and research on the environment of sports parks through the data statistics method can provide a comprehensive understanding of the natural ecological conditions of the parks, the green coverage, the degree of environmental pollution, the noise level and other related indicators, which can provide a scientific basis for

the further improvement and management of the parks. As a scientific research method, the data statistics method can objectively reflect the real situation of the environment of sports parks and provide reliable basis and decision-making support by systematically collecting, organizing and analyzing a large amount of data [4] . The study aims to conduct a scientific investigation and research on the environment of sports parks based on the data statistics method, and to explore how to provide a scientific basis for the improvement and management of the environment of sports parks through the collection, collation and analysis of data, guided by the concept of green development. Specifically, the study will use questionnaire survey, on-site observation and statistical data analysis to investigate key indicators such as vegetation distribution, air quality, noise level and park users' satisfaction in the park, in order to gain a comprehensive understanding of the current situation and problems of the sports park environment. Through the conduct of the study, it is expected to provide certain theoretical and practical support for the green development and sustainable management of the sports park environment, and to contribute to the construction of a healthy and livable urban environment.

2 A survey on the environment of sports parks based on the statistical method of data

2.1 Environmental survey of sports parks

The environmental survey and study of sports parks is an important exercise that aims to assess the environmental conditions of sports parks, make recommendations for improvement, and promote the green and sustainable development of the parks. The following are some of the key aspects of a survey study on the environment of a sports park: First, the survey study should focus on the facilities and layout of the sports park, which includes the type, quantity, quality and distribution of sports facilities. For example, whether there are sufficient sports grounds, fitness equipment and shower facilities in the park. It is also necessary to assess whether the layout of the park is reasonable, easy to use and safe. Secondly, the quality of the environment is also an important aspect of the survey and research, which includes air quality, noise level, green coverage, water use, and so on. Researchers need to monitor these indicators and assess their impact on the users of sports parks. For example, the quality of air has a direct impact on the respiratory health of sports people, while the green coverage rate affects the aesthetics and leisure atmosphere of the parks. In addition, research studies need to focus on the activities and people in the parks. This includes the frequency of use of the sports park, the type of users, and the behavior and activities of the users. This information can help researchers understand the status of park use and problems, and make targeted recommendations for improvement. Finally, the research study also needs to focus on the management and maintenance of the park, which includes the cleanliness of the park, safety and security measures, and management rules and regulations. Well-managed and maintained sports parks can provide a better user experience and attract more people to exercise and leisure. The environment for physical exercise in parks refers to the park green space as the basis, through rational planning and design, to provide the public with places and facilities to carry out physical exercise activities, including the natural environment, artificial facilities and the social environment in three aspects. In terms of natural environment, park green space can

provide fresh air, beautiful landscape and suitable climate, providing a place for citizens to enjoy themselves physically and mentally. At the same time, plants in parks can produce negative oxygen ions, which is conducive to improving human health. In terms of artificial facilities, the environment for physical exercise in parks should be equipped with perfect facilities and good conditions for use, such as fitness equipment, sports grounds, rest facilities and so on. The planning and design of these facilities need to meet the needs of citizens of different ages, genders and health conditions, and at the same time ensure safety, hygiene and convenience. As for the social environment, the environment for physical exercise in parks should create a positive, healthy and harmonious atmosphere. This requires enhanced publicity and education to raise the public's awareness of sports and health literacy, and to encourage the public to actively participate in sports and exercise activities. At the same time, park management should strengthen management and maintenance to ensure environmental hygiene and public safety in parks.

2.2 Influence of park environment on physical activity behavior in parks

The park environment has a multifaceted effect on park physical activity behavior [5]. Individual's behavior is the result of the interaction between individual's psychology and the environment, which is shown in Wenle's formula in equation (1).

$$B = f(P \cdot E) \quad (1)$$

In equation (1), the occurrence of individual's physical activity behavior is influenced both by the individual's internal factors, such as physical activity awareness and motivation, and by the external environmental stimuli. The park environment influences people's physical activity behavior mainly by providing places and facilities for exercise and creating a positive social atmosphere to satisfy people's physical activity needs and motivation. If the park environment can satisfy people's basic needs, such as complete facilities, beautiful environment, and harmonious atmosphere, then people are more likely to engage in physical activity in the park. In this process, the individual's need and motivation for physical activity plays a key role. If individuals realize the importance of sports to their health and have strong motivation to exercise, they may be willing to exercise even if the park environment is not particularly ideal. On the contrary, if individuals lack the need and motivation to exercise, then even if the park environment is good, it may not be able to stimulate their exercise behavior. Therefore, in order to promote people's park exercise behaviors, a combination of internal and external environmental factors of individuals need to be considered. Park managers can attract more people to participate in park physical activity by improving the park environment, providing diverse exercise facilities, and creating a positive social atmosphere. The relationship between the factors that generate park physical exercise behavior is shown in Figure 1.

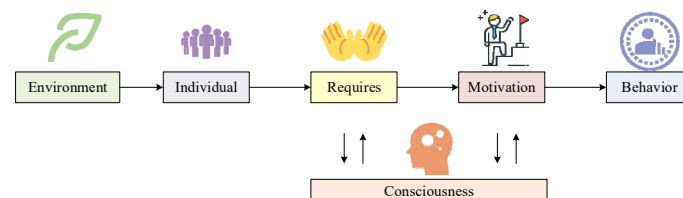


Fig. 1. Relationship between factors that generate physical activity behavior in parks

Awareness of park exercise is an important factor that has an impact on behavior mainly in the perception of human needs. When people are aware of their health needs or other related needs, corresponding motivation is generated, which drives people to take action. The influence of park exercise awareness on park physical activity behavior is a multi-level and multi-faceted process. It not only affects people's perceptions and needs for exercise, but also drives people to take action through motivation and decision-making processes. Park exercise awareness also plays a contributing role in the process of behavior implementation and maintenance. Therefore, improving people's awareness of park exercise is of great significance in promoting national fitness and improving public health. In order to attract more people to participate in park exercise, park managers need to plan and improve in many ways, and at the same time, they also need to make continuous improvements based on the public's needs and feedback in order to create a better park exercise environment.

2.3 Questionnaire design for sports parks based on mathematical statistics

The study set up a questionnaire survey to understand the public's satisfaction with and use of the Chengdong Sports Park and their evaluation of the park's environment and facilities in order to provide data support for the park's optimal management. The study utilizes a standard content validity test, which is evaluated through an expert review method to ensure that the content of the questionnaire is comprehensive, accurate and appropriate for the target population. Finally, the Telfer method was utilized to collect expert opinions through anonymous methods and to reach a consensus based on this. The questionnaire survey was used to get a comprehensive understanding of the public's satisfaction with the sports park, its use and evaluation of the park's environment and facilities [6]. The aim is to provide reliable data support for the optimized management of the park in order to promote the continuous improvement of the park environment and enhance the satisfaction and participation of the public. The target of the survey is mainly the public, especially those who frequently patronize the sports park, to ensure the representativeness and validity of the survey results. The questionnaire can be designed with the following aspects of content basic information, including age, gender, occupation, etc., in order to understand the basic situation of the respondents. Survey the number of times people visit the sports park per week, main activities, etc. in order to understand the use of the park. Ask respondents to evaluate the overall environment, facilities, services, etc. of the sports park to understand the satisfaction of the public. To collect respondents' suggestions on the existing deficiencies and future development of the Sports Park in order to promote the continuous improvement of the park. The experts and questionnaire recovery are shown in Table 1.

Table 1. Experts and questionnaire recovery

Classifier for laps, turns, rounds	1	2	3	Add up the total
Questionnaires/copies distributed offline	50	50	50	150
Questionnaires/copies collected offline	43	48	45	136
Recovery rate	86%	96%	90%	90%
Fill out the questionnaire online / copy	100	100	100	300
Online valid questionnaire	89	88	91	268

Recovery rate	89%	88%	91%	89%
Expert A	57.3	54.2	55.6	/
Expert B	42.7	45.8	44.4	/

An initial review of the collected raw data is carried out to check the completeness and consistency of the data. Processing of missing data, which may require filling in missing values by interpolation, deletion or imputation. Coding of data to convert open-ended questions or text answers from questionnaires into a numerical format that can be used for statistical analysis. Clean up outliers or incorrect data to ensure the accuracy of the data set. Create a structured data entry template using spreadsheet software. Enter the organized data into an Excel spreadsheet, ensuring that each variable is clearly defined and labeled. Implement data validation rules to minimize entry errors. Ensure that all raw data and analysis results are stored securely and create backups in case of data loss. Comply with data protection regulations to ensure confidentiality and privacy of data.

3 Statistical results of environmental survey data of sports parks

The number of valid questionnaires in this research is 404, and the respondents are mainly concentrated among Chengdu citizens who do fitness exercise several times a week in Chengdong Sports Park. Among the respondents, there were 213 males and 191 females. In terms of age distribution, there were 52 people under 18 years old, 283 people between 18 and 59 years old, and 69 people over 60 years old. The basic information of the respondents is shown in Table 2.

Table 2. Basic information of respondents

Sports event	Basic Information	Quorum	Proportions
Exercise period	5:00~8:00	123	30.5%
	8:00~11:00	63	15.6%
	11:00~14:00	28	6.9%
	14:00~17:00	56	13.8%
	17:00~20:00	134	33.2%
Exercise frequency	1 time/week	141	35.0%
	2 times/week	183	45.3%
	3 times/week	54	13.4%
	More than 3 times/week	26	6.4%
Exercise duration	<1h	152	37.6%
	1~2h	173	42.8%
	>2h	79	20.0%
Sporting event	ride	94	23.3%
	walk	112	27.7%
	equipment exercise	63	15.6%
	ball sports	87	21.5%
	do exercises etc.	48	11.9%

In Table 2, in terms of fitness frequency and time, 93.7% of the people worked out less than three times a week, and 80% worked out for less than two hours each time. Citizens mainly chose to exercise in the morning from 5:00 to 8:00 and in the evening from 17:00 to 20:00. In

the sports parks, people mainly do cycling, walking, equipment exercise, ball games, gymnastics and other sports programs, with most people choosing walking. In addition, the public's demand for ball games and group sports is also greater, which essentially reflects the demand for expanding the area of sports venues per unit. In summary, the frequency of use and satisfaction of the public with the sports parks are high, but there are still some sports programs and facilities that need to be further improved and expanded to meet the diversified sports needs of the public. The study further assessed the results of the evaluation of the environmental importance and satisfaction of sports parks, and the evaluation values were normalized, and the results are shown in Table 3.

Table 3. Evaluation of environmental importance and satisfaction of sports parks

Serial number	Norm	Significance	Job satisfaction	Standard deviation	Relief	t-value	P-value
1	Facility conditions	0.82	0.69	0.99	-0.21	-2.27	0.003
2	Green vegetation	0.74	0.71	1.01	-0.27	-2.51	0.015
3	Air quality	0.76	0.73	1.03	-0.25	-2.43	0.007
4	Noise in the park	0.78	0.75	1.05	0.11	11.57	0.000
5	Flow of people	0.80	0.77	1.07	0.23	9.24	0.000
6	Security situation	0.82	0.79	1.09	0.16	3.58	0.001
7	Management services	0.84	0.81	1.11	0.04	4.81	0.000
8	Spatial arrangement	0.86	0.82	1.13	0.17	7.26	0.000
9	landscape design	0.88	0.68	1.15	0.06	5.88	0.000
10	Clean and healthy	0.89	0.7	1.17	0.09	11.26	0.000
11	Guided tours	0.75	0.72	0.99	0.48	9.34	0.000
12	Parking service	0.74	0.74	1.10	0.26	8.63	0.000

In Table 3, from the results of the paired samples t-test, the p-value of the two-tailed test for all 12 factors is less than 0.05, which indicates that there is a significant difference in the evaluations of the respondent groups in terms of importance and satisfaction, and that there is a significant cognitive gap between the respondents' expectations and actual satisfaction with the City East Sports Park. The standard deviation of all the factors is less than 1.33, which indicates that there is less bias in the opinions and attitudes of the respondent group, and most of them are more consistent. In terms of mean deviation, nine factors have higher expectations than satisfaction while only three factors have lower expectations than satisfaction. This is further evidence that the majority of respondents are not satisfied with the current condition of the City East Sports Park and believe that there is a need to upgrade and remodel the park in a number of areas.

4 Conclusion

With the acceleration of urbanization and the improvement of people's health awareness, the number and scale of sports parks are expanding. Therefore, it is necessary to further strengthen the research and practice of sports parks in terms of policy formulation, facility construction, publicity and promotion. The study investigates and researches the environment of sports parks through the data statistics method, to comprehensively understand the environmental conditions of the parks, to find out the existing environmental problems, and to formulate targeted improvement measures. The results of the study show that in terms of fitness frequency and time, 93.7% of the citizens work out less than three times a week, and 80% of them work out for less than two hours each time. Citizens mainly chose to exercise in the morning from 5:00 to 8:00 a.m. and in the evening from 17:00 to 20:00 p.m. The results of the study show that 93.7% of the citizens worked out less than three times a week, and 80% worked out for less than two hours at a time. The p-value of the two-tailed test for all 12 factors is less than 0.05, which indicates that there is a significant difference in the evaluation of importance and satisfaction among the respondent groups, and that there is a significant cognitive gap between the respondents' expectations and actual satisfaction with the Chengdong Sports Park. There is a large gap between the existing conditions of the Chengdong Sports Park and the expectations of the sports and leisure groups, and there is a need for various aspects of upgrading and remodeling. The current study mainly relies on data from a specific city, which makes the results of the study may not be representative of the environmental conditions of sports parks in other cities or regions. In order to enhance the generalizability of the study, future research could expand the sample to include more cities and different types of sports parks.

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