An Empirical Study of The Effect of Urban Street Park on Park Users' Mood

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Abstract. Urban street park is an important part of the urban park system, and also a kind of park with high contact frequency in people's daily life, so it has potential promoting effect on people's mental health. In order to test the effect of urban street park on the mood state of park users, this study took a street garden in Hefei of China as the research site and used stratified sampling method to carry out a questionnaire survey on park users visiting the park at different time periods. One way ANOVA results show that there is a significant difference in the mood changing scores among park users in the different groups of the satisfaction of the environment of the green landscape space, the resting space and the fitness space. Regression analysis results show that the park users' satisfaction with the environment of the green landscape space and the resting space and the time spent in the park are positively correlated with their mood changes, indicating that the better quality of the environment of the green landscape space and the resting place of the park, the longer the park users staying in the park, the more positive effect of the park environment on users' mood state. The conclusion provides a scientific basis for the related research on the mental health effects of urban parks.

1. Introduction

Since the emergence of modern society, human beings have always attached importance to the symbiotic relationship with nature, especially when choosing the living environment, they will choose the location with beautiful green landscape to build the residence⁴. In modern cities, urban parks, as one of the material spaces for urban residents to return to nature and contact with nature, have always played an important role in improving the health of the population. A large number of studies have confirmed that urban parks have positive effects in relieving stress, regulating mood and improving anxiety and depression²⁴. As a type of urban park with high frequency of use by urban residents, whether urban street parks have a positive role in improving the mood state of the population is an important issue discussed in this article. Therefore, the study explores the effect of urban street parks on the mood state of users by assessing the degree of mood change of people after using the park and their satisfaction with the different space of the park. The results could enrich the content of the mental health promoting effects of urban parks and provide theoretical guidance for urban street park design.
2. Object and Methods

2.1. Study site
The research site is a street garden located in the old urban area of Hefei of China, covering an area of about 4000 m², surrounded by residential and commercial buildings. The park is designed with natural design method. The green landscape space is the main space (Fig 1), and there are also some resting spaces under trees (Fig 2), as well as one exercise and fitness space (Fig 3), which mainly serves the surrounding residents and nearby workers.

2.2. Study object
The study object is the people who visit the park at different time periods. According to ethical requirements, the questionnaire survey was conducted by stratified sampling method from September to December 2019, and all study participants voluntarily filled out the questionnaire with knowledge. A total of 140 questionnaires were collected, excluding people with chronic diseases, and 118 valid questionnaires were obtained, and the effective rate of the questionnaire was 84.29%.

2.3. Study content and tools
The contents of the study include the information of park users' personal characteristics, the degree of mood change and the evaluation of the satisfaction of park environment. The information of park users' personal characteristics, such as gender, age, height, weight, marital status, educational background, vocation type and income level, and the degree of mood change were investigated by self-designed questionnaire. The park users' satisfaction of the environment of the different space of the park is evaluated by self-designed satisfaction questionnaire, and the questionnaire consists of three self-assessment entries: "Are you satisfied with the environment of the green landscape space of the park? "Are you satisfied with the environment of the resting space of the park? "Are you satisfied with the environment of the fitness space of the park? ". Entry assignment consists of five levels: unsatisfactory (1) to satisfactory (5).

2.4. Analysis method and variable assignment
In the study, descriptive analysis, ANOVA and multivariate linear regression are used for statistical analysis. The score of the degree of mood change and the park users' satisfaction of park environment are expressed in the form of mean ± standard deviation (Mean ± SD). The multivariate regression analysis include the mood changing score of park users as dependent variable, time spent in the park, the evaluation score of the satisfaction of the environment of the green landscape space, the resting space and the fitness space as independent variables, and also include gender, age, height, weight, marital status, education level, vocation type and income as control variables. The method of assignment of each variable is shown in Table 1.

| Variable Code | Assignment Description |
|---------------|------------------------|
|               |                        |

Figure 1. Green landscape space  
Figure 2. Resting space  
Figure 3. Fitness space
### Gender

- X1: 0=Male, 1=Female

### Age (year)

- X2: 1<18, 2=18–23, 3=23–30, 4=30–50, 5>50

### Height (cm)

- X3: 1<160, 2=160–170, 3=170–180, 4>180

### Weight (kg)

- X4: 1<45, 2=45–55, 3=55–65, 4=65–75, 5>75

### Marital Status

- X5: 1=Unmarried, 2=Married, 3=Divorced or Widowed

### Education Level

- X6: 1=Primary school, 2=junior high school, 3=high school, 4=diploma,

### Vocation Type

- X7: 1=student, 2=Office work, 3=Physical work, 4=Retired

### Income (RMB)

- X8: 1<2000, 2=2000–5000, 3=5000–8000, 4=8000–12000, 5>12000

### The satisfaction of the environment of green landscape space

- X9: 1=Low, 2=Relatively Low, 3=Middle, 4= Relatively High, 5=High

### The satisfaction of the environment of resting space

- X10: 1=Low, 2=Relatively Low, 3=Middle, 4= Relatively High, 5=High

### The satisfaction of the environment of fitness space

- X11: 1=Low, 2=Relatively Low, 3=Middle, 4= Relatively High, 5=High

### Time spent in the park

- X12: 1<30, 2=31–60, 3=60–120, 4=120–180, 5>180

### Mood change

- Y: 1=Very badly, 2=Worse, 3=No changes, 4=Better, 5=Very well

### Results

#### 3.1. General information of respondents

A total of 118 park users were included in this study, of which 64 were male, accounting for 54.24%. See table 2 for details.

| Variable                  | Sort            | No. | Ratio (%) | Mood Change (x±s) |
|---------------------------|-----------------|-----|-----------|-------------------|
| Total                     |                 | 118 | 100       | 4.45±0.579        |
| Gender                    | Male            | 64  | 54.24     | 4.17±0.592        |
|                           | Female          | 54  | 46.76     | 4.52±0.563        |
| **F**                     |                 |     | 3.86      | <0.05             |
| P                         |                 |     |           |                   |
| Age (year)                | <18             | 8   | 6.78      | 4.25±0.463        |
|                           | =18–23          | 19  | 16.10     | 4.21±0.713        |
|                           | =23–30          | 18  | 15.25     | 4.56±0.616        |
|                           | =30–50          | 37  | 31.36     | 4.54±0.558        |
|                           | >50             | 36  | 30.51     | 4.47±0.506        |
| **F**                     |                 |     | 3.46      | <0.05             |
| P                         |                 |     |           |                   |
| Height (cm)               | <160            | 21  | 17.80     | 4.38±0.590        |
|                           | =160–170        | 41  | 34.75     | 4.46±0.596        |
|                           | =170–180        | 44  | 37.29     | 4.41±0.583        |
|                           | >180            | 12  | 10.17     | 4.67±0.492        |
| **F**                     |                 |     | 0.74      | 0.533             |
| P                         |                 |     |           |                   |
| Weight (kg)               | <45             | 8   | 6.78      | 4.50±0.756        |
|                           | =45–55          | 26  | 22.03     | 4.35±0.562        |
|                           | =56–65          | 43  | 36.44     | 4.53±0.592        |
|                           | =66–75          | 28  | 23.73     | 4.43±0.504        |
|                           | >75             | 13  | 11.02     | 4.38±0.650        |
| **F**                     |                 |     | 0.50      | 0.738             |
| P                         |                 |     |           |                   |
| Marital Status            | Unmarried       | 29  | 24.58     | 4.24±0.636        |
|                           | Married         | 86  | 72.88     | 4.55±0.524        |
|                           | Divorced or Widowed | 3   | 2.54      | 3.67±0.577        |
3.2. The mood changing score
Descriptive statistical analysis of the mood changing score of park users from the aspect of personal social characteristics is shown in Table 2. The mood changing score of 118 park users was (4.45±0.579) point. The mood changing scores among the different group of sex (P <0.05), age (P <0.05), marital status (P <0.01), education level (P <0.001), vocation type (P <0.01) and income (P <0.01) were statistically significant.

3.3. The evaluation score of park environment satisfaction
The evaluation score of 118 park users of the satisfaction of green landscape space was (4.44±0.65) point, of resting space was (4.35±0.67) point and of fitness space environment of the park was (3.74±0.88) point. Generally speaking, the users have the lowest satisfaction of the environment of fitness space, the satisfaction of the environment of resting space is in the middle, and the satisfaction of the environment of green landscape space is the highest.

3.4. The analysis of the mood changing score among different group of park environment satisfaction
One way ANOVA results showed that, there was a significant difference in the mood changing scores among park users in the different groups of the satisfaction of the environment of green landscape space (F=21.23, P<0.001), of resting space(F=18.88, P<0.001) and of fitness space (F=3.36, P<0.05). See table 3.

Table 3. The mood changing score among different groups of park environment satisfaction

| Sort                                      | Score | Mood change       | F     | P    |
|-------------------------------------------|-------|-------------------|-------|------|
| The satisfaction of the green landscape space environment | 3     | 3.64±0.516        | F=21.23 | P<0.001 |
|                                            | 4     | 4.15±0.419        |       |      |
|                                            | 5     | 4.82±0.398        |       |      |
| The satisfaction of the resting space environment | 3     | 3.85±0.556        | F=18.88 | P<0.001 |
|                                            | 4     | 4.31±0.547        |       |      |
|                                            | 5     | 4.72±0.452        |       |      |
| The satisfaction of the fitness space environment | 3     | 4.34±0.627        | F=3.36  | P<0.05  |
|                                            | 4     | 4.51±0.546        |       |      |
|                                            | 5     | 4.63±0.495        |       |      |
3.5. Regression analysis

Based on existing literature[7], in the study, the effect of urban street parks on the degree of mood change of park users was discussed by constructing a regression model. Regression analysis showed that gender, age, education level, vocation type, time spent in the park, the satisfaction of the environment of green landscape space and resting space could be included in the regression equation. Among them, gender, age, education level and vocation type were included in the form of dummy variables. The specific formula of the equation is:

\[ \hat{y} = 45.03 + 0.566X_1 - 8.332X_2 - 7.703X_3 - 7.945X_4 - 8.624X_5 + 1.2X_6 - 1.78X_7 - 1.568X_8 + 1.6X_9 + 0.395X_{10} + 2.679X_{12} \]

The results showed that the mood changing score of the female users were higher than that of men; among the group of different age, the mood changing scores of the group of 18~23, 23~30, 30~50 and older than 50 were lower than that of park users aged younger than 18; among the group of different education level, the mood changing scores of park users with the education level of junior high school and university were higher than that with primary school; among the group of different vocational type, the mood changing scores of park users engaged in indoor work was lower than that of students, and there were no significant difference between other vocational types; park users' satisfaction with the environment of green landscape space and resting place of the park was positively correlated with the mood changing score, and the higher the satisfaction was, the higher the mood changing score of the park users. The regression coefficient results are shown in Table 4.

| Independent Variable                                      | Coef. | t     | 95% CI         | V(t) |
|-----------------------------------------------------------|-------|-------|----------------|------|
| Female\(^a\)                                              | 0.566 | 2.59  | 0.326~3.014    | 1.42 |
| Age=18~23\(^b\)                                           | -8.322| -3.52 | -13.013~3.632  | 2.67 |
| Age=23~30\(^b\)                                           | -7.703| -2.40 | -14.072~1.333  | 2.73 |
| Age=30~50\(^b\)                                           | -7.945| -2.45 | -14.393~1.506  | 1.98 |
| Age>50\(^b\)                                              | -8.624| -2.61 | -15.175~2.075  | 2.03 |
| Junior high school\(^c\)                                  | 1.200 | 2.74  | 0.869~2.269    | 2.35 |
| Diploma\(^c\)                                             | 1.780 | 2.43  | 1.034~3.644    | 2.46 |
| Office work\(^d\)                                         | -1.568| -2.53 | -4.063~1.233   | 2.73 |
| The satisfaction of the environment of green landscape space| 1.600 | 3.02  | 0.682~3.882    | 1.15 |
| The satisfaction of the environment of resting space       | 0.395 | 3.18  | 0.216~3.671    | 1.29 |
| The satisfaction of the environment of fitness space       | 0.378 | 1.23  | 0.985~1.741    | 2.41 |
| Time spent in the park                                    | 2.679 | 3.71  | 0.801~3.946    | 1.27 |
| Constant                                                  | 45.03 | 8.65  | 34.670~55.336  |     |

\[ F = 4.86 \]

\[ Prob > F = 0 \]

\(^* P < 0.1, ^{**} P < 0.05, ^{***} P < 0.01. ^{a} Male, ^{b}Primary school, ^{c}Student as the control group.\]

4. Conclusion

This study explored the impact of urban street parks on the mood state of park users by investigating the personal characteristics of 118 park users, the park users’ satisfaction of the park environment and their degree of mood change after visiting the park. The mood changing score of 118 park users was (4.45±0.579) points. According to the demographic characteristics analysis, female users have higher mood changing score than male users, which means the promotion effect of the street park on female's mental status is greater than that of male's. During the group of different age of park users, there are different mood changing score and the users aged between 23~30 and 30~50 have the highest mood changing scores, which means the park has a higher effect on promoting the mental status of 23-30 and 30~50 age groups compared with other age groups. There is a difference in the degree of mood change among park users with different marital status. Park users who are married have the highest mood changing scores, which means the promotion effect of the street park on married people's mental state is greater than that of single people.
status is greater than others. There are differences in the mood changing scores of the park users with different educational background, and the users with junior high school education have the highest mood changing scores, while the users with undergraduate degree or above have the lowest mood changing scores, which means the effect of the street park on the mental status of people with low education background is higher than that of people with high education background. During the group of different occupation types, there are different mood changing scores, and the users engaged in office work have the highest mood changing scores, and the student users have the lowest mood changing scores, which means the park users engaged in office work are more likely to change their mood state by visiting the park when compared with other types of work. The users with different income levels have different mood changing scores, and the users whose monthly income is less than 2,000 yuan have lowest mood changing scores, while the users whose monthly income is higher than 8000 months have the highest mood changing scores, which means the street park has a higher effect on the mental status of the park users with high-income.

The results of one-way ANOVA showed that the difference of mood changing scores among park users with different groups of evaluation score of park environment satisfaction was statistically significant, the higher the park users' satisfaction with the environment of the park, the higher their mood changing scores.

Regression analysis shows that the park users’ satisfaction of the park environment of green landscape space and resting space is positively correlated with their mood changing scores, the higher the satisfaction is, the better the mood changes of users are. It shows that the better the quality of the park environment of green landscape space and resting space is, the better the mood changes of users which promoted by the park. And also, there is a positive correlation between the time that the users spent in the park and the degree of their mood change, the longer the time the users spent in the park, the better their mood changes.

5. Discussion
The conclusion of this study shows that the environment of green landscape space of urban street parks is the park space environment with the highest improvement of park users’ mood, which has the greatest promotion effect on users' mood state, followed by the park environment of resting space, while the environment of fitness space has the least promotion effect on users' mood state. Therefore, in the future, we should pay attention to shape the quality of the park environment of green landscape space and resting space when designing urban street parks, which could play the promoting effect of urban street park on people's mental health.

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