

ANALYSIS OF KEY CONSIDERATIONS OF THE PUBLIC WHEN CHOOSING RECREATIONAL ACTIVITIES

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ABSTRACT

This study aims to investigate the key considerations of the public when choosing recreational activities, and concludes the key factors to be considered when choosing recreational activities, as well as the influence of various factors by means of literature review, expert interview, questionnaire survey, and Analytical Hierarchy Process (AHP). Through analysis, this study identified 12 influential factors for selecting recreational activities, among which the most important 6 influential factors are improving physical ability, body building, pressure relief, traffic convenience, cost, and comfort of exercise environment, at 77.6%.

KEYWORDS

Recreational activities, Analytical Hierarchy Process, Influence.

1. INTRODUCTION

Many studies, of both scientific and medical circles, have pointed out the benefits of recreational activities [1-3]. Many medical and scientific reports indicate that activity and exercise are methods to promote health and prevent disease, and suggest fostering the habits of regular activities and exercising for at least 30 minutes every day [4]. Recreational activities not only promote physical health, but also have the functions of promoting mental health development, can be attached with the pursuit of pleasure, and achieve the effect of social activities.

Recreational activities have complex and diverse classifications, as well as different classification standards due to different research purposes of scholars, changing times, and the influence of many relevant factors, such as social evolution. In Taiwan, Hsieh and Jeng [5] divided recreational activities into recreation activities related to media, culture, exercise, social needs, outdoor activities, and hobbies. Hung [6] divided recreational activities into recreation activities related to ball exercises, leisure, tourism, the art of attack and defense, activities above water and in water, entertainment, art, physical fitness, and breathtaking activities. Hsieh and Jeng [7] divided recreational activities into recreation activities related to the art of attack and defense, recreation, tourism, recreational activities, consumption, team, water and art, static activities, football activities for two people, etc. People are engaged in a variety of recreational activities,

but aim to pursue nothing more than health, achievements, knowledge accumulation, social relations, stimulating body and mind, physical exercise, killing time, pressure relief, etc.[5-8]. However, the considerations of people for when choosing recreational activities remains in question; therefore, the research purposes are as follows:

- To clarify the factors to be considered when choosing recreational activities.
- To analyze the influence of various factors to be considered when choosing recreational activities.

2. LITERATURE REVIEW

2.1. Recreational activities

Over time, Taiwanese people have changed their lifestyles, with more concerns on health and exercise. Taiwan's government has invested hundreds of millions of dollars in promoting exercise and leisure every year in order to promote health and improve quality of life. The public have become more involved recreational activities, which can have positive influence on their physiology and psychology [9].

2.1.1. Physiology

- Achieving the effect of weight loss by burning calories and reducing appetite.
- Reducing the risk of diabetes.
- Improving their physical fitness.
- Regular exercise helps to effectively reduce blood pressure.

2.1.2. Psychology

- Promoting excitement and pleasant feelings: Studies of psychologists and sociologists show that exercise has certain curative effects on depression. Studies also show that a chemical substance, known as beta-endorphin, will be improved within the nervous system during exercise, which allows people to have excited and pleasant feelings and promote positive thinking.
- Pressure relief: Recreational activities help to reduce the pressure of the circulatory system of the body, promote physical health, and have the function of promoting mental health.

2.2. Delphi method

The Delphi method is a decision-making method, where the problems of an issue are sent to experts to consult their opinions, which are then collected and summarized in order to conclude comprehensive opinions, and these comprehensive opinions are returned to the experts in order that all experts can change their original opinions on the basis of a set of comprehensive opinions, and summarize their opinions, thus, gradually achieving consistent results after such repeated steps. This method is widely representative, as such investigation allows neither direct discussions among experts, nor transverse association, and through repeated consulting, summary, and modification, finally concludes the basic consistent views of the experts [10-12].

2.3. AHP

AHP (Analytical Hierarchy Process) was developed by Thomas L. Saaty at the University of

Pittsburgh in 1971, but it was not perfected until after 1980 [13, 14]. AHP aims to solve problems that are very complex and require the consideration of too many influential factors, meaning it is a decision-making method with multiple assessment criteria developed under uncertain circumstances [15].

AHP systematically breaks down problems, hierarchizes the problems, then determines the ratio of relative importance between factors through the pairwise comparison method, and arranges the option sequence, which becomes the basis for selecting the best option. It aims to systematize complex problems, collect related information through a logical and hierarchical structure, and make decisions and evaluations according to ideas and intuitive judgment. For policy makers, the hierarchical structure helps to understand issues, cut complex and unstructured situations into a number of components, set up the hierarchical order, determine the importance of each variable in accordance with the subjective judgment, and determine the priority of each variable after a series of judgments and statistics, thus, helping decision makers to reach conclusions[16-19].

3. RESEARCH METHOD

3.1. Establish a hierarchical structure

In order to investigate the factors considered by the public, and choose recreational activities and the degrees of importance of various factors, this study first identified the factors based on existing literature, selected the factors that affect the choice of recreational activities, and constructed the preliminary hierarchical structure. An effective and complete hierarchical structure was established after repeated analyses on the preliminary hierarchical structure by Delphi questionnaire survey, until expert consensus was reached.

The Delphi questionnaire survey is based on the consensus of experts and scholars; however, during its process, the response rate of the survey tends to decline with the increased number of times it is repeated. Therefore, this study conducted two rounds of Delphi questionnaire survey. The process is as shown in Table 1:

Table 1. Implementation process of Delphi questionnaire

Times	Content
Lead time	The experts were invited to take the questionnaire survey, and their agreement with the research proposal was obtained.
First questionnaire survey on April 15, 2014	<ul style="list-style-type: none"> ● The experts received the first invitation letter and first round of questionnaire. ● Delphi experts filled out the questionnaire.
Second Delphi questionnaire survey on July 25, 2014	<ul style="list-style-type: none"> ● The experts received the second invitation letter and second questionnaire of Delphi experts, along with the answer records and analysis results of the first questionnaire. ● The experts filled out the questionnaire, summarized the results, and conducted reliability test of the questionnaire results.

After the second Delphi questionnaire survey, the questionnaire was modified according to the experts' opinions to reach their consensus, and the hierarchical structure of key factors in choosing recreational activities was then constructed (Tables 2 and 3). There are three hierarchical structures: 1) the key factors considered for choosing recreational activities; 2) the influential factors, including physical health, psychology, social climate, place, and cost; 3) the

influential factors, including 12 factors. The hierarchical structure is as shown in Figure 1.

Table 2. Delphi questionnaire survey results (1)

Influential factors	First Delphi questionnaire results	Second Delphi questionnaire results
Internal personal factors	Personal health	Physical health
External factors	Personal psychology	Psychology
Physical health	Social factors	Social climate
Psychology	Environmental factors	Place and cost
Interest	Cost factors	
Society		
Environment		
Cost		

Table 3. Delphi questionnaire survey results (2)

Influential factors	First Delphi questionnaire results	Second Delphi questionnaire results
Increase physical fitness	Increase physical ability	Improving the physical ability
Exercise injury	Exercise injury	Body building
Body building effect	Body building effect	Technical difficulties of exercise
Increase the ability to protect physical health	Years of being involved in exercise items	Self-challenge
Years of exercise	Technology and difficulty	Pressure relief
Self-realization	Self-challenge	Interest
Pressure relief	Pressure relief	Social needs
Interest and abundance	Interest	Joint activities of family
Technical advancement	Family and social needs	Social popularity
Probability of becoming hobby	Social popularity	Comfort level of the exercise environment
Breathtaking and challenging	Government driving	Traffic convenience
Involved in exercise teams	Place requirements	Cost
Social needs	Comfort level of the exercise environment	
Family and parent-child	Traffic convenience	
Social popularity	Limit of number of people in exercise items	
Traffic convenience	Cost of facilities	
Exercise environment and space	Place cost	
Place getting difficulty		
Limit of number of people in exercise items		
Cost of facilities		
Place cost		

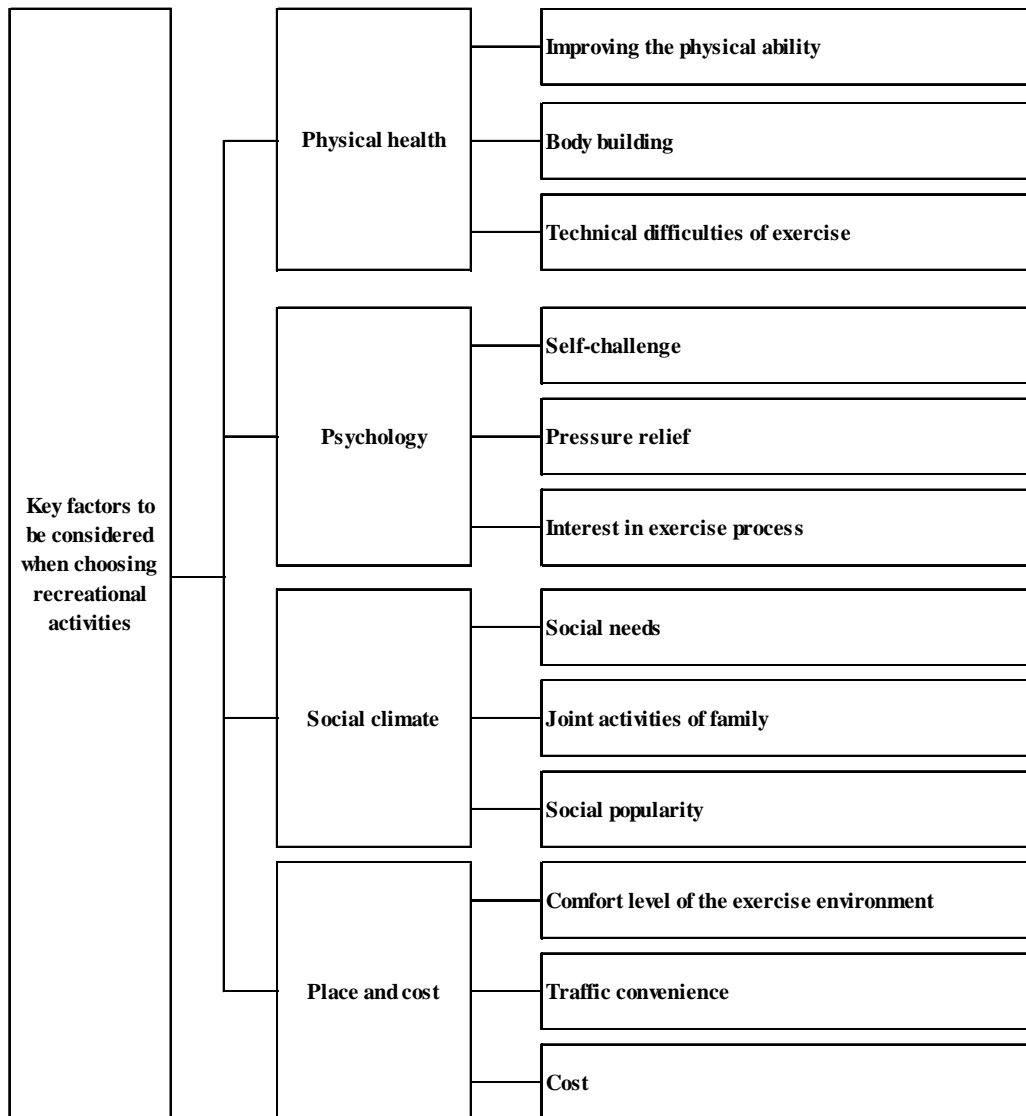


Figure 1. Hierarchical structure of key factors to be considered when choosing recreational activities

3.2. Analytic hierarchy process (AHP)

AHP uses a nominal scale, rather than a physical scale. The scale includes: equal importance, moderate importance, essential importance, very strong importance, and extreme importance, as well as four scales between each two (Table 4). Based on the suggestions of Saaty and Vargas [19], the AHP questionnaire was designed to be easily comprehensible and able to show comparison. In addition, the content description could guide the respondents to compare two factors.

Table 4. Definitions and descriptions of the evaluation scale [13, 14]

Evaluation scale	Definition	Description
1	Equal importance	The contributions of two schemes to be compared have equal importance
3	Weak importance	Experience and judgment tends to slightly favor a scheme
5	Essential importance	Experience and judgment tends to strongly favor a scheme
7	Extremely strong importance	Practice shows a very strong tendency to favor a scheme
9	Absolute importance	Enough evidence affirms to absolutely favor a scheme
2,4,6,8	Moderate importance between adjacent scales	When moderate importance is required

AHP first establishes a hierarchical structure, then collects the objective opinions of experts, breaks down and simplifies complex problems from the top down, and quantifies choice orientations difficult to present, in order to have a clear understanding, easily appraise priority through comparison, improve decision quality, and be closer to the factors affecting the key points for the public to choose recreational activities. Pairwise comparison steps in AHP criterion are, as follows [13-21]:

1) Establish a pairwise comparison matrix:

Suppose that there are factors $A_1, A_2, A_3, A_4, \dots, A_n$ in a hierarchy, the weight of each factor is $W_1, W_2, W_3, \dots, W_n$, and then a pairwise comparison matrix is established accordingly, where the relative importance of any two items A_i and A_j is expressed as a_{ij} , and the pairwise comparison matrix of factors $A_1, A_2, A_3, A_4, \dots, A_n$ is $A = [a_{ij}]$. If weights $W_1, W_2, W_3, \dots, W_n$ are known, then the pairwise comparison matrix $A = [a_{ij}]$ can be expressed as Eq. 1.

$$A = [a_{ij}] = \begin{bmatrix} W_1/W_1 & W_1/W_2 & \dots & W_1/W_n \\ W_2/W_1 & W_2/W_2 & \dots & W_2/W_n \\ \dots & \dots & \dots & \dots \\ W_n/W_1 & W_n/W_2 & \dots & W_n/W_n \end{bmatrix} \quad (1)$$

where $a_{ij} = W_i/W_j, a_{ji} = W_j/W_i, i, j = 1, 2, \dots, n$

2) Calculate the maximum eigenvector and eigenvalue:

Based on the pairwise comparison matrix, it is possible to calculate the eigenvector corresponding to the maximum eigenvalue (known as the advantageous vector and weight distribution). The pairwise comparison matrix A multiplied by vector \bar{W} consists of the weights of various criteria, and can be expressed as Eq. 2:

$$\bar{W} = (W_1, W_2, W_3, \dots, W_n)^T$$

$$A \bar{W} = \begin{bmatrix} W_1/W_1 & W_1/W_2 & \dots & W_1/W_n \\ W_2/W_1 & W_2/W_2 & \dots & W_2/W_n \\ \cdot & \cdot & \dots & \cdot \\ W_n/W_1 & W_n/W_2 & \dots & W_n/W_n \end{bmatrix} \begin{bmatrix} W_1 \\ W_2 \\ \cdot \\ W_n \end{bmatrix} = \lambda \begin{bmatrix} W_1 \\ W_2 \\ \cdot \\ W_n \end{bmatrix} \quad (2)$$

Eq. 2 shows that, the pairwise comparison matrix A multiplied by \bar{W} is equal to the value of λ multiplied by \bar{W} ; namely $A \bar{W} = \lambda \bar{W}$. λ is the eigenvalue of A, and is the eigenvector of the pairwise matrix A corresponding to the eigenvalue.

In practical pairwise comparison, a_{ij} is obtained through subjective judgment; therefore, it must have a certain gap with the practical W_i/W_j , and becomes $a_{ij} \approx W_i/W_j$. When a_{ij} has small changes, the eigenvalue will change accordingly. When the eigenvalue is no longer equal to λ , λ is still the main eigenvalue, and is very close to the eigenvalue of the theoretical weight. Namely, λ is replaced with $\lambda \max$, as shown in Eq. 3.

$$A \bar{W} = \lambda \max \times \bar{W} \quad (3)$$

The steps of calculating the maximum eigenvalue $\lambda \max$ are, as follows. A new vector \bar{W}' will be obtained through multiplying the pairwise comparison matrix A by the obtained eigenvector \bar{W} , as shown in Eqs. 4 and 5.

$$A \bar{W} = \bar{W}' \quad (4)$$

$$\begin{bmatrix} W_1/W_1 & W_1/W_2 & \dots & W_1/W_n \\ W_2/W_1 & W_2/W_2 & \dots & W_2/W_n \\ \cdot & \cdot & \dots & \cdot \\ W_n/W_1 & W_n/W_2 & \dots & W_n/W_n \end{bmatrix} \begin{bmatrix} W_1 \\ W_2 \\ \cdot \\ W_n \end{bmatrix} = \begin{bmatrix} W_1' \\ W_2' \\ \cdot \\ W_n' \end{bmatrix} \quad (5)$$

$\lambda \max$ can be obtained by dividing each known vector value by each of the original values, and then calculating the arithmetic average of all obtained quotients, as shown in Eq. 6.

$$\lambda \max = \frac{1}{n} \left(\frac{W_1}{W_1} + \frac{W_2}{W_2} + \dots + \frac{W_n'}{W_n} \right) \quad (6)$$

3) Consistency tests:

It is difficult to request that respondents achieve consistency in pairwise comparison, thus, consistency tests are required to obtain a consistency index (C.I.) (Eq. 7) in order to check whether the pairwise comparison matrix consisting of respondents' answers is a consistency matrix. Saaty [15] suggested that, C.I.= 0 denotes complete consistency of the evaluators' judgment, where C.I. ≤ 0.1 is an acceptable error value, thus, ensuring consistency.

$$C.I. = \frac{\lambda \max - \lambda}{n - 1} \quad (7)$$

A positive reciprocal matrix is obtained from the assessment scale of 1 to 9, and the C.I. under different number of hierarchies is a random index (R.I.). In a matrix with the same number of hierarchies, the ratio of C.I. to R.I. is known as the C.R. (consistency ratio, Eq. 8). Saaty [15] suggested that $C.R. \leq 0.1$ means that consistency reaches an acceptable level.

$$C.R. = \frac{C.I.}{R.I.} \tag{8}$$

4. RESULTS AND DISCUSSION

4.1. Consistency tests

In the pairwise comparison, AHP must meet the transitivity between quality relationship and strength relationship. However, in the actual process, as it is difficult to avoid errors caused by some factors, consistency tests are necessary; therefore, Saaty suggested checking the consistency of the pairwise comparison matrix with the consistence ratio (C.R.). This study investigated the experts of recreational activities in Taiwan, including 6 physical education teachers, 5 members of recreational activities organizations, and 4 recreational activities promoters. This study distributed 15 questionnaires, and recovered 13 samples. After eliminating 4 invalid samples, there were 9 valid samples. Table 5 shows the consistency tests results, all of which meet the standard of $C.I. \leq 0.1$ and $C.R. \leq 0.1$, as proposed by Saaty[19].

Table 5. Consistency tests results

First hierarchy	Second hierarchy			Third hierarchy		
Goal	Influential factors	C.I.	C.R.	Influential factors	C.I.	C.R.
Key factors to be considered when choosing recreational activities	Physical health	0.0703	0.0781	Improving the physical ability	0.0369	0.0636
				Body building		
				Technical difficulties of exercise		
	Psychology			Self-challenge	0.0401	0.0692
				Pressure relief		
				Interest in exercise process		
	Social climate			Social needs	0.0002	0.0003
				Joint activities of family		
				Social popularity		
	Place and cost			Comfort level of the exercise environment	0.0015	0.0026
				Traffic convenience		
				Cost		

4.2. Results Analysis

4.2.1. Weight value of the influential factor hierarchy and its order

As can be seen from the pairwise comparison matrix and weights of the 4 influential factors, as shown in Tables 6 and 7, the influences of the 4 factors are ranked in descending order: physical health (0.478), place and cost (0.268), psychology (0.185), and social climate (0.069). The results show that the public choose recreational activities after primary considerations of promoting physical health and physical beauty, the influence of which is as high as 47.8%, the secondary consideration of place and cost, the influence of which is as high as 26.8%, and tertiary consideration of pressure relief, the influence of which is as high as 18.5%, while the influence of social climate on choosing recreational activities by the people is only 6.9%.

Table 6. Pairwise comparison matrix of the influential factor hierarchy

	Physical health	Psychology	Social climate	Place and cost
Physical health	1.000	4.429	4.857	1.571
Psychology	0.226	1.000	3.286	0.905
Social climate	0.206	0.304	1.000	0.219
Place and cost	0.636	1.105	4.566	1.000

Table 7. Weight values of the influential factor hierarchy

	Physical health	Psychology	Social climate	Place and cost	Weights
Physical health	0.484	0.648	0.354	0.425	0.478
Psychology	0.109	0.146	0.240	0.245	0.185
Social climate	0.100	0.045	0.073	0.059	0.069
Place and cost	0.308	0.162	0.333	0.271	0.268

4.2.2. Weight values of the influential factor hierarchy, and its order

(1) Influential factor: physical health

As can be seen from the pairwise comparison matrix and weight analysis of Tables 8 and 9, the importance of 3 influential factors is ranked in descending order; improving physical ability (0.482), body building (0.344), and technical difficulties of exercise (0.174). Where, improving physical ability and body building are important factors to the public.

Table 8. Pairwise comparison matrix (influential factor: Physical health)

	Improving the physical ability	Body building	Technical difficulties of exercise
Improving the physical ability	1.000	1.857	2.162
Body building	0.538	1.000	2.619
Technical difficulties of exercise	0.463	0.382	1.000

Table 9. Result of weight analysis (influential factor: Physical health)

	Improving the physical ability	Body building	Technical difficulties of exercise	Weights
Improving the physical ability	0.500	0.573	0.374	0.482
Body building	0.269	0.309	0.453	0.344
Technical difficulties of exercise	0.231	0.118	0.173	0.174

(2) Influential factor: psychology

As shown in Tables 10 and 11, the importance of 3 influential factors is ranked in descending order; pressure relief (0.613), interest in exercise process (0.254), and self-challenge (0.132). The weights of the three factors are greatly different, meaning pressure relief and interests are valued by the public, while the influence of self-challenge is only 13.2%.

Table 10. Pairwise comparison matrix (influential factor: psychology)

	Self-challenge	Pressure relief	Interest in exercise process
Self-challenge	1.000	0.276	0.390
Pressure relief	3.623	1.000	3.286
Interest in exercise process	2.562	0.304	1.000

Table 11. Result of weight analysis (influential factor: psychology)

	Self-challenge	Pressure relief	Interest in exercise process	Weights
Self-challenge	0.139	0.175	0.083	0.132
Pressure relief	0.504	0.633	0.703	0.613
Interest in exercise process	0.357	0.193	0.214	0.254

(3) Social climate

According to Tables 12 and 13, the importance of 3 influential factors is ranked in descending order; joint activities of family (0.447), social needs (0.341), and social popularity (0.213). The weight of joint activities of a family is the highest, and its importance degree reaches 44.7%, showing that the public attach great importance to joint family activities, followed by social needs, the importance degree of which also reaches 34.1%, and social popularity has 21.3% influence on choosing recreational activities by the public.

Table 12. Pairwise comparison matrix (influential factor: social climate)

	Social needs	Joint activities of family	Social popularity
Social needs	1.000	0.778	1.571
Joint activities of family	1.286	1.000	2.143

Social popularity	0.636	0.467	1.000
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Table 13. Result of weight analysis (influential factor: social climate)

	Social needs	Joint activities of family	Social popularity	Weights
Social needs	0.342	0.346	0.333	0.341
Joint activities of family	0.440	0.446	0.455	0.447
Social popularity	0.218	0.208	0.212	0.213

(4) Place and cost

As shown in Tables 14 and 15, the importance of 3 influential factors is ranked in descending order; comfort level of the exercise environment (0.339), traffic convenience (0.339), and cost (0.321). The 3 influential factors have equal influence, with 32.1% ~33.9% influence on choosing recreational activities by the public.

Table 14. Pairwise comparison matrix (influential factor: place and cost)

	Comfort level of the exercise environment	Traffic convenience	Cost
Comfort level of the exercise environment	1.000	1.000	0.896
Traffic convenience	1.000	1.000	1.057
Cost	1.116	0.946	1.000

Table 15. Result of weight analysis (influential factor: place and cost)

	Comfort level of the exercise environment	Traffic convenience	Cost	Weights
Comfort level of the exercise environment	0.321	0.339	0.304	0.321
Traffic convenience	0.321	0.339	0.358	0.339
Cost	0.358	0.321	0.339	0.339

4.2.3. Overall weight values and their order

The overall weights of the 12 influential factors can be obtained through calculation, and are ranked in descending order in Table 16, where the top 6 important influential factors are successively: improving physical ability (0.230), body building (0.164), pressure relief (0.113), traffic convenience (0.091), cost (0.091), and comfort of exercise environment (0.086). The total influence of which on choosing recreational activities by the public is more than 77.5%; while that of the remaining 6 influential factors (technical difficulties of exercise, interests, joint activities of family, self-challenge, social needs, social popularity) is only 22.5%. When choosing recreational activities, people first consider "improving physical ability", which accounts for 23% of the overall weight, followed by considering "body building" (importance degree 16.4%), and "pressure relief" (importance degree 11.3%). The influence of the three influential factors totals more than 50%, showing that contemporary people attach the greatest importance to their physical health, pursuing physical beauty, and relieving mental pressure. The influence of 3

factors (social popularity, social needs, self-challenge) on choosing recreational activities by the public is the lowest (only 6.3%).

Table 16. Ranking of relative weights of influential factors on choosing recreational activities by the public

Influential factors	Overall weight	Overall ranking
Improving the physical ability	0.230	1
Body building	0.164	2
pressure relief	0.113	3
Traffic convenience	0.091	4
Cost	0.091	5
Comfort level of the exercise environment	0.086	6
Technical difficulties of exercise	0.083	7
Interest in exercise process	0.047	8
Joint activities of family	0.031	9
self-challenge	0.024	10
social needs	0.024	11
social popularity	0.015	12

5. CONCLUSION

This study identified 4 factors to be considered when choosing recreational activities: physical health, psychology, social climate, and place and cost. Twelve 12 key influential factors were determined: improving physical ability, body building effect, required technical difficulty of exercise, self-challenge, pressure relief, interest in exercise process, social needs, joint activities of family, social popularity, comfort of exercise environment, traffic convenience, and cost.

The results showed that, when choosing recreational activities, people first consider "improving physical ability"(importance degree 23%), and then consider "body building" (importance degree 16.4%) and "pressure relief"(importance degree 11.3%). The influence of the three influential factors accounts for more than 50%, showing that people attach the greatest importance to their physical health, pursuing physical beauty, and relieving mental pressure. Influence of the factors, such as social popularity, social needs, and self-challenge, on choosing recreational activities is extremely low (only 6.3%).

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