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# The Quantitative Analysis on the Individual Characteristics of Urban Residents and Their Sport Consumption Motivation

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## Abstract

Using the questionnaire, mathematical statistics and entropy measurement methods, the quantitative relationship between the individual characteristics urban residents and their sports consumption motivation are studied. The results show that the most main sports consumption motivation of urban residents is fitness motivation and social motivation. Urban residents of different gender, age, education and income levels are different in regulating psychological motivation, rational consumption motivation and seeking common motivation

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Keywords: Sports Consumption; Consumption Motivation; Information Entropy; Urban Residents

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## 1. Introduction

Consumption is one of the fundamental economic activities of human society. With the increasing promotion of people's living level, urban residents' consumption structure gradually optimizes: in residents' consumption structure, besides the consumption for survival as the mainstay, consumption for development and recreation enjoy a higher and higher proportion. Sports consumption is one for recreation and gradually develops into a major part of modern people's life consumption. According to Baidu, sports consumption is defined as consumption for people's sport activities and relevant costs. It mainly includes the cost used to buy sports clothes and equipment, sports periodicals and newspaper and ticket fares to watch sports games, shows and expenditures and other costs for taking part in various sports activities, fitness training and receiving some sports medical treatment. The definition shows that sports consumption refers to direct and indirect ones. Residents' sports consumption level can show the development level of our country's market and industry and can also measure their living standard and fitness status. Residents' sports consumption motivation is both the trend and activation of their sports consumption. Without motivation, there would be no consumption. Residents with different characters have different sports consumption motivation. This paper surveyed about urban residents' sports consumption motivation, made an analysis about the survey results and tried to find out the quantitative relationship between the individual characteristics and their sports consumption motivation, which is of vital significance to promote the development of our country's sports market and industry.

## 2 Literature Review

Sports consumption has become a hot issue of present study. A lot of scholars have studied about different characteristics of various groups' sports consumption from different aspects, for example, the analysis on the current situation of sports consumption, sports consumption theories, the psychological factors of sports consumption, sports consumption views, sports consumption motivation and behavior and so on. Huo Deli analyzed college students' sports consumption modes and characteristics and maintained that college students had a higher initiative in sports consumption, and male and female students showed differences in their consumption motivations and their campus atmosphere affected their consumption behavior. Yue Haixia made an analysis on the variance analysis on gender characteristics influence of sports consumption behavior of college students and his conclusion was that female students are more rational in sports consumption. Zhao Jianghong made a study about the main factors of teenagers' psychological expectation of sports consumption and some relevant environment such as teenagers' family economic status, market environment of their sports consumption and the access to sports consumption information and so on. Shen Keyin and Zhou Xuerong discussed about the declination of ethics and moral dilemma in sports consumption and they held that the proper choice of Confucian consumption ethics was beneficial to the establishment of contemporary sports consumption theory. Zhu Hongwei made a survey about the current consumption situation of urban residents in Guangdong Province. The result of the survey showed that the increase in sports consumption in Guangdong province was comparatively slow, and people's sports consumption awareness was rather weak and their consumption structure was unreasonable. Xi Hongmei analyzed the effect of China urban consumer's individual difference in sports consumption belief and behavior. The result showed that people's income and their education level are positively correlated with their sports consumption and Chinese civil servants' consumption belief and behavior were more rational and active than other workers. Wang Xiaozhen surveyed and analyzed urban peasant workers' sports consumption situation. Her survey showed that peasant workers spent more on consumption of sports practicality, mainly influenced by their income and mass-following psychology. Luo Binqun and Sun Wen did a research on sports consumption feature of different family style in Beijing. Their research showed that different family styles were different in time, space, pattern and belief of their sports consumption. These previous researches show that the study on sports consumption has related to many aspects in various fields but the researchers generally focused on the qualitative analysis of the correlation between influencing factors and sports consumption, and few made a study on their quantitative relationship.

## 3 Research Object And Data Analysis Method

### 3.1 Research Object

This research mainly analyzed the quantitative relationship between the individual characteristics urban residents and their sports consumption motivation. Individual characteristics are defined as gender, age, annual income and education level. We did a survey about the individual characteristics of urban residents. The process of survey is divided into two periods: the data collected in the first period were mainly to determine the factor composition of sports consumption motivation quantitative table by cancelling unreasonable items the value of whose factor loading is comparatively small. In this period, we handed out 215 questionnaires and collected 208. Among them, valid questionnaires were 198, with the retrieving rate 92.1%. In the second period, we issued 338 formal questionnaires to collect data to analyze the quantitative relationship between individual characteristics and sports consumption motivation and collected back 331. The valid questionnaires were 321, with the retrieving rate 95%.

### 3.2 Data Analysis Method

The two-period analysis method is used to analyze collected data. In the first period, factor analysis was carried out from sports consumption motivation quantitative table and main factors of sports consumption were got. SPSS software was used to test the reliability and validity of quantitative table to establish a good-structure sports consumption quantitative table. In the second period, the data from the formal questionnaire table were analyzed. The information entropy method was used to analyze the quantitative relationship between individual characteristics and sports consumption motivation.

#### 4 The Compiling Of Sports Consumption Motivation Quantitative Table

##### 4.1 Factor Analysis Of The Quantitative Table

To analyze the relationship between individual characteristics and sports consumption motivation, sports consumption motivation quantitative table included two kinds of information: information of individual characteristics and sports consumption motivation proposition. This paper divides the information of individual characteristics as follows (see table 1).

Table 1 classification of residents' individual characteristics

residents' individual characteristics	classification of residents' individual characteristics
gender	Male; female
age	Below 20; 21-30; 31-40; 41-50.; 51-60; above 60
Annual income	20,000; 20,000-50,000; 50,000-100,000; more than 100,000 (in RMB)
Education level	Middle school ; high school or technical secondary school; junior college or university, postgraduate or doctor

According to the definition and analysis of residents' sports consumption and their motivation in some literature, 12 items of question about sports consumption motivation were determined. The evaluation level on each item can be divided into: very important, important, generally important, and not important. The factor structure was determined by KMO test and Bartlett's sphericity test. SPSS software showed that KMO was 0.892, and the significance of Bartlett's sphericity test was 0.000, which means that factor analysis was advisable. By analyzing the value of characteristics of quantitative table, the rate of factor contribution and accumulative contribution rate, we found that there were 5 factors whose value of characteristics was above 1, and their accumulative contribution rate was 60.186%. Therefore, we picked out 5 factors. Among them, the highest loading value of variant was 0.826, and the lowest was 0.383. This shows that the quantitative table was reasonably designed. The five factors are named to be: fitness motivation, social motivation, motivation of adjusting psychology, rational consumption motivation and seeking common grounds motivation. The quantitative table of sports consumption motivation is as table 2.

Table 2 question item of sports consumption motivation

Sports consumption motivation	Question items
fitness motivation	Take part in sports activities in order to do some exercises
	Take part in sports activities for fitness
social motivation	Take part in sports activities so as to get to more friends
	Take part in sports activities to show one's own value
motivation of adjusting psychology	Take part in sports activities to get to know more friends
	Take part in sports activities to make me feel happier
rational consumption motivation	This sports product has a higher performance-price ratio
	This sports product has strong practicality
	This sports event fits me

	Take part in these sports activities because I like them
seeking common grounds motivation	Taking part in this sport activity is very popular at present.
	Taking part in the sports activity or buying the product is influenced by friends.

4.2 Test Of The Validity And Reliability Of The Quantitative Table

Reliability is an index to measure the stability and consistency of a quantitative table. The bigger the value of reliability is, the more reliable the quantitative table is. Generally speaking, if the value of the reliability is between 0.60 and 0.65, the quantitative table has a lower reliability and should be redesigned. If it is between 0.65 or 0.70, the quantitative table is a minimum acceptable one; if between 0.70 and 0.80, the table is good-designed; if between 0.80 and 0.90, the table is pretty good. Cronbach’s alpha coefficient and split-half reliability were used. Table 3 shows the Cronbah’s Alpha coefficient value and split-half coefficient value of both the quantitative table and respective factors. The table shows that the quantitative table has a good reliability.

Table 3 test of reliability of the quantitative table of sports consumption motivation

	Cronbach's Alpha	Split-Half Coefficient
The quantitative table	0.812	0.798
fitness motivation	0.851	0.839
social motivation	0.847	0.833
motivation of adjusting psychology	0.839	0.827
rational consumption motivation	0.826	0.821
seeking common grounds motivation	0.832	0.819

Validity shows the extent to which a measurement tool can measure. The validity analysis of a questionnaire is mainly on its structure validity. The structure validity can measure the rationability of the structure of a quantitative table. The validity analysis of the structure of a quantitative table is to analyze the relevance of factors themselves and that of factors and the total table by adopting factor analysis way. Rational structure validity should show a medium-sized relevance between factors. If there is higher relevance value between factors, it means that there is some overlapping between the factors and some overlapped factors should be cancelled. If the relevance value between factors is too low, it shows that some factors are totally different from what should be tested. The relevance value of factors to the total quantitative table should be higher than that of factors between themselves, which suggests that the factors are different from each other but at the same time, the same psychological characteristic is measured. Table 4 shows that the relevance values of the factors between themselves are from 0.192 to 0.325. And the relevance values of factors to the total score are from 0.472 to 0.702. The result shows the independence of five factors and their correspondent assignment and the questionnaires collected have better structure validity.

Table 4 matrix of validity of internal consistency of the quantitative table of sports consumption motivation

	fitness motivation	social motivation	motivation of adjusting psychology	rational consumption motivation	seeking common grounds motivation	The quantitative table
fitness motivation	1.000	0.268	0.341	0.315	0.220	0.632

social motivation	1.000	0.289	0.257	0.241	0.472
motivation of adjusting psychology		1.000	0.280	0.325	0.702
rational consumption			1.000	0.192	0.523
motivation seeking common grounds				1.000	0.516
The quantitative table					1.000

### 5 Information Entropy Measurements

Information entropy measures the uncertainty of information. The orderly a system is, showing lower uncertainty, the smaller the value of information entropy is and vice versa. Residents’ choice of the importance of every item in sports consumption motivation questionnaire is an uncertain behavior; therefore, the information entropy can be used to measure the dispersion of the choice of different consumption motivations in the questionnaire.

If a system might be in various states, and the probability of each state occurring is  $p_i (i = 1, 2, \dots, m)$ ,

$$H = -k \sum_{i=1}^m p_i \ln p_i$$

the entropy of the system can be defined as:

For every sports consumption motivation factor, there are many evaluation attributes. This paper defined these evaluation attributes as: very important, important, generally important, and not important. For a sports consumption motivation factor, if it has m evaluation attributes and n index items, they form an m-by-n evaluation matrix of item attributes:

$$R = (r_{ij})_{m \times n} = \begin{bmatrix} r_{11} r_{12} \cdots r_{1n} \\ r_{21} r_{22} \cdots r_{2n} \\ \cdots \\ r_{m1} r_{m2} \cdots r_{mn} \end{bmatrix}$$

$r_{ij}$  is the value of  $r_j$ . The entry in the i-th row and the j-th column of a matrix is typically referred to as the  $i, j, (i, j)$ th entry of a matrix A is most commonly written as  $a_{i,j}$

The entry in the i-th row and the j-th column of the matrix is  $r_{ij}$ . It represents the value of the i-th evaluation attribute at the j-th column of index item. Then the contribution level of all the evaluation to  $r_j$  of the index item can be expressed by entropy:

$$H_j = -k \sum_{i=1}^m p_{ij} \ln p_{ij}$$

$$p_{ij} = \frac{r_{ij}}{\sum_{i=1}^m r_{ij}}, \quad k = 1/\ln n$$

And,

So, the quantitative relation of residents’ with different characteristics to the j-th evaluation index can be expressed as:

$$G_j = \frac{(1-H_j)}{\sum_{j=1}^m (1-H_j)}$$

## 6 Results and Analysis

### 6.1 The Quantitative Relationship between Gender and Sports Consumption Motivation

The entropy of residents of different genders and 5 sports consumption motivations was calculated to make sure their quantitative relationship shown as table 5. The table shows that the fitness motivation of urban residents is obviously higher than other sports consumption motivations. Male and female residents are different in importance of different motivations: male residents have a higher tendency in social motivation and that of adjusting psychology than female ones. This suggests that male residents are more willing to make friends and show their own value by sports activities and adjust their psychological pressure by sports consumption. Female residents have more rational consumption and seeking common grounds motivations than male ones. It suggests that females are more rational in consumption, but their consumption is likely to be influenced by surroundings and friends or colleagues.

Table 5 the relationship between gender and sports consumption motivation

	Fitness motivation	Social motivation	Motivation of adjusting psychology	Rational consumption motivation	Motivation of seeking common grounds
male	0.326	0.311	0.204	0.098	0.061
female	0.338	0.176	0.102	0.237	0.147

### 6.2 the quantitative relationship between ages and sports consumption motivation

Table 6 describes the importance level of different sports consumption motivation in the understanding of residents of different ages. Residents of different ages show some consistency in their understanding of some motivations, for example, they all think that sports consumption is very important for the motivation of fitness, which accounts for an important proportion. Young residents take exercise for fitness and health and old-aged residents probably for health. There is an inconsistency in social motivation. Comparatively younger and older residents account for a larger proportion. Younger residents think the social motivation important in that they want to enlarge their social circle whereas older residents want to relocate themselves by making friends with some old-aged friends by sports consumption because of their sense of loss and loneliness after retirement. Middle-aged residents think the motivation of adjusting psychology important because they have more pressure from their work and life. Residents of different ages show inconsistency in rational consumption motivation. Older residents are more rational. The youngest group and the oldest one are more obvious in terms of motivation of seeking common grounds.

Table 6 the relationship between residents' ages and sports consumption motivation

	Fitness motivation	Social motivation	Motivation of adjusting psychology	Rational consumption motivation	Motivation of seeking common grounds
Below 20	0.278	0.328	0.097	0.087	0.210
21-30	0.306	0.317	0.174	0.103	0.104
31-40	0.317	0.217	0.185	0.186	0.095
41-50	0.324	0.157	0.213	0.237	0.069
51-60	0.338	0.107	0.127	0.325	0.103

Above 60	0.387	0.201	0.078	0.211	0.123
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6.3 the quantitative relationship between annual income and sports consumption motivation

Table 7 shows the importance level of sports consumption motivations in the understanding of residents with different annual incomes. Residents of different annual incomes all think that fitness is the most primary motivation of sports consumption. Groups of different annual incomes show consistency in social motivation and motivation of adjusting psychology, but inconsistency in rational consumption. Residents of lower incomes are more rational and they tend to spend money when necessary. In terms of seeking common grounds, residents of high income are more willing. The possible reason might be that they are willing to follow fashion and brands.

Table 7 the quantitative relationship between annual income and sports consumption motivation

	Fitness motivation	Social motivation	Motivation of adjusting psychology	Rational consumption motivation	Motivation of seeking common grounds
Less than 20,000(in RMB)	0.352	0.128	0.127	0.345	0.048
20,000-50,000	0.337	0.225	0.187	0.138	0.113
50,000-100,000	0.329	0.251	0.188	0.175	0.077
More than 100,000	0.336	0.187	0.225	0.127	0.135

6.4 the quantitative relationship between education levels and sports consumption motivation

Table 8 shows the importance level of sports consumption motivations in the understanding of residents of different education levels. Residents of different education levels have the same understanding about the importance of fitness motivation. But in terms of social motivation and motivation of seeking common grounds, residents of higher education level have more requirements for exercise; in the aspect of seeking common grounds, the higher education level residents have, the lower motivation they have.

Table 8 the quantitative relationship between education levels and sports consumption motivation

	Fitness motivation	Social motivation	Motivation of adjusting psychology	Rational consumption motivation	Motivation of seeking common grounds
Below Middle school	0.331	0.138	0.117	0.178	0.236
High school or technical secondary school	0.312	0.219	0.183	0.152	0.134
Junior college and university	0.333	0.228	0.191	0.163	0.085
Post graduate and doctor	0.337	0.207	0.228	0.159	0.069

7 Conclusions

This paper discussed about the individual characteristics of urban residents and their sport consumption motivation. The research found that: residents of different individual characteristics all think sports consumption important in improving health, relieving work and life pressure and harmonizing interpersonal relationship and so on. But they also show some common and different understanding of sports consumption motivations.

Firstly, fitness motivation is generally considered to be the most important consumption motivation by

residents of all individual characteristics. This suggests that residents have an eager pursuit for health. And they are willing to spend money in “purchasing health”. They all know the importance of a healthy body in that men can only better enjoy their life or better work and study with a healthy body.

Secondly, needs of social contact are also regarded to be very important motivation of sports consumption. Generally, residents are willing to improve their interpersonal relationship and realize communication between people by sports consumption. While people are taking exercise, they can make friends, adjust their mode and gain new information to promote the healthy development of both their body and mind.

Thirdly, residents commonly think that the motivation of sports consumption is to adjust their psychology, but people with different individual characteristics may show some differences. The above survey shows that the males of 21 to 50 years old with medium or above annual income and diploma of high school or above have obvious motivation of adjusting psychology. This is because men with those characteristics are generally under greater life and work pressure, so they want to relieve their psychological pressure by taking part in sports activities.

Fourthly, in terms of rational consumption and seeking common grounds, individuals with different characteristics also show different consumption motivation. Females are more rational than males and have more motivations of seeking common grounds. Older residents also have more obvious rational consumption belief, but age doesn't bear much relationship with the motivation of seeking common grounds. Instead, the youngest group and the oldest group have stronger desire of seeking common grounds. People with lower annual income have more rational consumption motivation in that they have less money to afford the expenditure. But men with higher annual income show more motivation of seeking common grounds, which might come out of comparing psychology. Residents with different education levels show little difference in rational consumption, and the higher of education level residents have the smaller motivation of seeking common grounds they show.

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