ISSN : 0974 - 7435 Volume 10 Issue 10

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(10), 2014 [4845-4854]

Community square collective sports activity sound development fuzzy evaluation research

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ABSTRACT

With community fitness activities implementing, square collective activities has become more of one of main forms for residents to carry out square fitness, the paper makes specific investigation and research on square collective activities. By analyzing contemporary environment's Chinese community collective activities participants residents number proportions in square fitness total numbers, as well as investigation research on number of participants age distribution, gender structure, income level, the paper finds that China's number of people that carry on square collective activities are further increasing, and middle-aged and old people occupy a large part. By correlation analysis method and fuzzy analysis method, it makes further investigation and research on benefits that Chinese community collective activities bring into residents. It gets: collective activities can let residents to beautify shape, free their minds, and enrich leisure lives, from which free minds is upmost benefit of group activities; appeal people that they should positive participate in fitness activities as Dayangge, social dance, square dance, Taijiquan and others, so that improve their physical quality and psychological quality, and make life better.

KEYWORDS

Collective activity; Physical and psychological health; Correlation analysis; Fuzzy evaluation.

INTRODUCTION

With rapidly development of economy, the rise of productivity, people have more leisure time, but duo to increasing psychological stress; people are looking for leisure ways that fit for them.

Pan Hai-Lin in the article " Jiaozuo city downtown square sports activities status exploration and investigation", by taking Jiaozuo city downtown square as research objects, he studied how people relief their moods and improve their physical quality and so on in the environment of so great life stress. In the paper, it mentioned that it should enrich community leisure activities, advertise fitness activities that fit for different groups of people, which not only was helpful for community coordination steady development, but also provided important foundation and theoretical guarantee for guaranteeing Chinese residents physical quality and spiritual quality health.

Shen Liang in the article "Chinese square dance fitness activity", took contemporary residents leisure activities as main research objects, and made investigation statistics of community group fitness activities, got that : in contemporary social environment, people more preferred to attend group activities, especially for old people, they were more inclined to participate in community square dance, because square dance integrated dance softness, fitness flexibility and not-too-high techniques, which was not only helpful for physical health, but also let their body coordination to be further improved.

Jiang Xiao-Zhen in the article " Community fitness leisure activities planning and research", by visiting and investigating on Chinese some main cities communities, analyzed data and got that no matter which ages residents, as long as they often participated in community group fitness activities, it would helpful for extending life, and residents that participated in fitness activities, they were relative full of spirits, left the impression of sunshine, therefore the paper suggested residents to often participate in leisure activities, they should go to places that surrounding as community square as much as possible at ordinary times, which was helpful for keeping good life attitudes.

The paper combines with formers research experiences, on this basis, utilize correlation analysis and fuzzy comprehensive evaluation methods, makes quantitative analysis of leisure activities impacts on residents body and physical health, and puts forward that residents carry on above 1hour leisure activities every day is helpful for physical health.

MODEL ESTABLISHMENT

Chinese square collective activities evaluation

Community square collective activity is main activity form of square fitness activities, and also is one of activities forms with most participants, research on Chinese partial regions and city square collective activities is helpful for Chinese square fitness activities further development, is of certain help in Chinese residents qualities improvements, relative data is as TABLE 1.

TABLE 1 : Chinese community square collective activities evaluation table

	Very reasonable	Relative reasonable	Basic reasonable	Unreasonable	Very unreasonable
Contents design	12%	18%	60%	6%	4%
Structure design	8%	10%	75%	7%	0

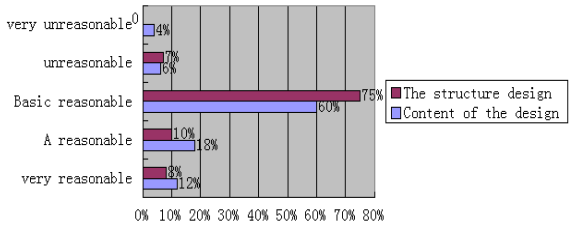

Figure 1 : Square table about our country community collective activity

According to above bar Figure 1, it gets Chinese residents are basically satisfied with community collective activities contents design, structure design, which shows Chinese residents relative accept community collective activities, but there are still partial people that are dissatisfied with its forms, therefore it should advertise proper collective activities on these people so as to let community activities to be further developed.

Chinese square collective activities participation group of people

Due to Chinese gender distribution are uncoordinated, aging, incomes differences and other problems, therefore make investigation research on Chinese each place residents participated collective activities gender distribution, age phase distribution, incomes status, correlation data is as TABLE 2 and TABLE 3 as well as Figure 2.

TABLE 2 : Community square collective activities participation genders status

	Male	Female
Number of people	67	33
Proportion	67%	33%

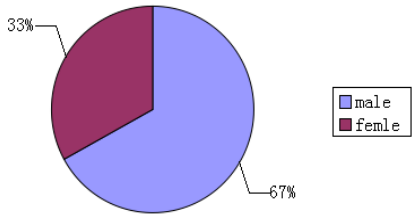

Figure 2: Participate in the community square collective activity of gender

TABLE 3 : Community square collective activities participation age group status

Age group	Below 30 years old	31-44 years old	45-59years old	60-74years old	Above 75 years old
Number of people	52	73	477	357	40
Proportion	5%	8%	48%	35%	4%

According to above TABLE 3 status, it carries on specific analysis and research, and draws following Figure 3:

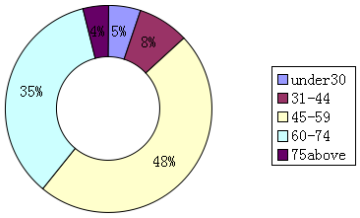

Figure 3: Participate in the community square age group activities

Below TABLE 4 is community square collective activities participation income status, make statistical analysis of it, and then study correlation results, the result is as following Figure 4:

TABLE 4 : Community square collective activities participation income status

Age group	Below 30 years old	31-44 years old	45-59years old	60-74years old	Above 75 years old
Number of people	52	73	477	357	40
Proportion	5%	8%	48%	35%	4%

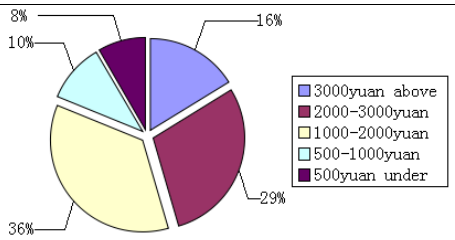

Figure 4: To participate in community square collective income situation

According to above investigation and research on Chinese residents participating in collective activities gender, age group, and incomes, it gets that in Chinese residents, more men participate in collective activities, and among them, mainly are middle-aged and old people, it reflects uneven distribution of Chinese collective activities participants that hinders Chinese collective sports activities development.

Resident community activities and physical and psychological health status research

Residents taken community activities are related to residents' physical and psychological health. Below TABLE 5 is investigation table about Chinese some city residents' community activities status, data is from Chinese sports council investigation result announcement and general administration of sport of China.

TABLE 5 : Community activities statistical table

	Male	Female
Participate in community activity	52.30%	47.70%
Don't participate in community activity	43.61%	56.39%

Draw above TABLE 5 into following statistical Figure 5, and analyze conclusion:

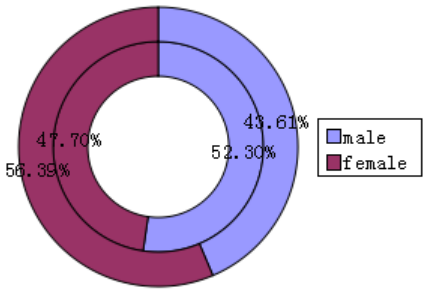

Figure 5: Physical exercise habits

Above ring statistical Figure 5 shows :Chinese men more participate in community activities, it is related to their requirement of mental and physical relaxation after one day working, while female are quite little, it provide orientation guiding and supports on developing community activities publicity in women group in China.

Carry on correlation analysis surely requires each factor to have certain connections or comparability, it included range almost covers each aspect of our life.

Pearson correlation coefficient is one kind of correlation analysis, its calculation formula is as following :

$$\rho(X,Y)=\frac{\operatorname{cov}(X,Y)}{\sigma_x\sigma_y}=\frac{E\left((X-\mu_x)(Y-\mu_y)\right)}{\sigma_x\sigma_y}$$

And $\mu_x=E(X),{\sigma_X}^2=E(X-\mu_x)^2=E(X^2)-E^2(X)$

Therefore, Pearson correlation coefficient can also be written as:

$$\rho(X,Y)=\frac{E(XY)-E(X)E(Y)}{\sqrt{E(X^2)-E^2(X)}\sqrt{E(Y^2)-E^2(Y)}}$$

When two variables Pearson correlation coefficient gets closer to 1or -1, it shows the two correlation is big, or closely related. It gets closer to 1 shows the two are in positive correlation, on the contrary it gets closer to -1 shows the two are in negative correlation.

According to correlation analysis theory, make analysis of Chinese residents' physical and psychological health, data is from national residents' health investigation and research results announcement and general administration of sport of China correlation investigation report.

TABLE 6 : Physical status table

	Health	Sub-health	Mild disease	Serious disease	Unable to function independently
Participate	72.3%	10.53%	5.74%	1.43%	10%
Don't participate	62.58%	16.07%	15.14%	2.22%	4%

Above TABLE 6 is Chinese residents physical health status, to further analyze residents physical status and their participation in sports activities relationships, now make correlation analysis on them, result is as following.

When study different exercises habits impact on psychological health, take above TABLE 6 data as observable variable, establish physical exercises habits and psychological health status correlation coefficient formula, utilize SPSS software handling with above table data, it can get following result, as TABLE 7:

TABLE 7: Correlations

		Health	Sub-health	Mild disease	Serious disease	Unable to function independently
Exercises frequency	Pearson correlation	.953*	.658	-.43	-.878	-.456
	Significance (bilateral)	.022	.146	.569	.050	.123

****. Significant correlated in the .01 level (bilateral)**

By above data TABLE 7, it can get conclusions: participate in community activities can relief residents from diseases, strengthen self immune competence, which provides foundation for Chinese national physical quality and spiritual quality improvement, and provide talents guarantee for building harmonious society.

Fuzzy comprehensive evaluation method-based community activities participation impacts on residents' physical and psychological health

Define evaluation indicator set, according to: $U=\{u_1,u_2,\cdots,u_m\},m=1,2,3,4$

Evaluation indicator set is ={beautify shape, free one's mind, social communication, regulate one's life}.

Define evaluation grade set, for systematic evaluation grade, mainly determination method is expert evaluation method. In community activities research on residents set physical and psychological health, according to: $V=\{v_1,v_2,\cdots,v_n\}, n=1,2,3,4$

Curative effects evaluation grade set is={very good, good, normal, bad}.

Define each evaluation indicator weight, weight mainly expression method is:

$$w=\{\mu_1,\mu_2,\cdots,\mu_m\}, m=1,2,3,4$$

Among them: $\sum_{m=1}^{6}\mu_m=1$

Define evaluation grade indicator weights methods are mainly analytic hierarchy process and normalization method, from which normalization formula is as following:

$$w_i=\frac{\frac{C_i}{\overline{S_i}}}{\sum_{i=1}^{n}\frac{C_i}{\overline{S_i}}},(i=1,2,\cdots,m)$$

Among them, w_i is evaluation parameter i monitoring value; $\overline{S_i}$ is evaluation parameter i standard arithmetic mean value of m grade, then weight set is: $w=\{w_1,w_2,\cdots,w_m\}$.

Here, apply normalization method to calculate weight, result is : $w_1=\{0.35,\ 0.11,\ 0.21,\ 0.33\}$

Define evaluation matrix, comprehensive evaluation matrix R evaluation method is mainly experts' evaluation method, analytic hierarchy process, membership function method.

Here use membership function method, define fuzzy relation matrix R, from which:

$$R=(R_1,\ R_2,\ R_3,R_4)^T$$

First design membership function

Evaluation grade on the 1 grade

$$\mu_{i1(u_i)}=\begin{cases}0 & u_i\geq v_{i2}\\ -\dfrac{u_i-v_{i2}}{v_{i2}-v_{i1}} & v_{i1}<u_i<v_{i2}\\ 1 & u_i\leq v_{i1}\end{cases}$$

Evaluation grade on the j grade

$$\mu_{ij(u_i)}=\begin{cases}0 & u_i \le v_{ij-1} \text{ or } u_i \ge v_{ij+1}\\ \dfrac{u_i-v_{ij-1}}{v_{ij}-v_{ij-1}} & v_{ij-1}<u_i<v_{ij}\\ -\dfrac{u_i-v_{ij+1}}{v_{ij+1}-v_{ij}} & v_{ij}\le u_i<v_{ij+1}\end{cases}$$

Evaluation grade on the n grade

$$\mu_{in(u_i)}=\begin{cases}0 & u_i \le v_{in-1}\\ \dfrac{u_i-v_{in-1}}{v_{in}-v_{in-1}} & v_{in-1}<u_i<v_{in}\\ 1 & u_i \ge v_{in}\end{cases}$$

Input data into above each parameter's each grade standard membership function formula, it can solve each evaluation parameter membership to each evaluation grade, and then construct fuzzy relation matrix R.

By calculation, it can solve:

$$R_1=\begin{pmatrix}0.3\\0.2\\0.1\\0.3\end{pmatrix};\ R_2=\begin{pmatrix}0.5\\0.1\\0.1\\0.3\end{pmatrix};\ R_3=\begin{pmatrix}0.5\\0.15\\0.1\\0.25\end{pmatrix};\ R_4=\begin{pmatrix}0.43\\0.15\\0.2\\0.4\end{pmatrix};$$

And then by $R=\left(R_1,\ R_2,\ R_3,\ R_4,\ R_5,\ R_6\right)^T$, it can get comprehensive evaluation matrix as following :

$$R_1^{'}=\begin{pmatrix}0.3 & 0.5 & 0.5 & 0.43\\ 0.2 & 0.1 & 0.15 & 0.15\\ 0.1 & 0.1 & 0.1 & 0.2\\ 0.3 & 0.3 & 0.25 & 0.4\end{pmatrix}$$

5 Carry on comprehensive evaluation, known $W=(\mu_j)_{1\times m}$, $R=(r_{ji})_{m\times n}$, by:

$$S=w\circ R=\left(\mu_1,\mu_2,\cdots,\mu_m\right)\circ\begin{pmatrix}r_{11} & r_{12} & \cdots & r_{1n}\\ r_{21} & r_{22} & \cdots & r_{2n}\\ \vdots & \vdots & \vdots & \vdots\\ r_{m1} & r_{m2} & \cdots & r_{mn}\end{pmatrix}=\left(s_1,s_2,\cdots,s_n\right)$$

It can get fuzzy evaluation set S, from which "$\circ$" is fuzzy composition operator. For fuzzy operator, it mainly has following kinds, as TABLE 8:

TABLE 8 : Fuzzy operator

Feature	Operator			
	M(∧,∨)	M(·,∨)	S	M(· , ⊕)
Reflect weights function	Not obvious	Obvious	Not obvious	Obvious
Comprehensive extent	Weak	Weak	Strong	Strong
Utilize R information	Insufficient	Insufficient	Relative sufficient	Sufficient
Type	Principal component prominent type	Principal component prominent type	Weighted average type	Weighted average type

Here take fuzzy operator as $M(\cdot, \oplus)$ operator, that:

$$s_k = \min\left(1, \sum_{j=1}^{m} \mu_j r_{jk}\right), k = 1, 2, \cdots, n$$

Input above computation result into above formula and can get:

$$S_1^{'} = (0.431, \quad 0.136, \quad 0.298, \quad 0.321)$$

By fuzzy evaluation vector S analysis, it makes comprehensive conclusion. Generally, it can adopt maximum membership principle, weighted average principle, fuzzy vector uniformization, and here applies maximum membership principle.

For maximum membership principle, if given fuzzy evaluation set $S = (S_1, S_2, \cdots, S_n)$, (from which S_i is grade v_i membership to fuzzy evaluation set), $M = \max(S_1, S_{2,} \cdots, S_n)$, M corresponding element is evaluation result of comprehensive evaluation.

By $S_1^{'} = (0.431, \quad 0.136, \quad 0.298, \quad 0.321)$ it is clear:

$$M_1 = \max(S_1, S_{2,} \cdots, S_n) = 0.431$$

Sports activities evaluations on several kinds of physical and psychological health evaluation, follow above analysis process, it can get:

Each evaluation indicator weight is:

$$w_2 = \{0.33, \quad 0.12, \quad 0.24, \quad 0.31\}$$

By calculation, it can get:

$$R_1 = \begin{pmatrix} 0.45 \\ 0.1 \\ 0.15 \\ 0.3 \end{pmatrix}; R_2 = \begin{pmatrix} 0.35 \\ 0.15 \\ 0.2 \\ 0.3 \end{pmatrix}; R_3 = \begin{pmatrix} 0.45 \\ 0.1 \\ 0.2 \\ 0.25 \end{pmatrix}; R_4 = \begin{pmatrix} 0.45 \\ 0.1 \\ 0.1 \\ 0.35 \end{pmatrix};$$

And then by $R = (R_1, \quad R_2, \quad R_3, \quad R_4, \quad R_5, \quad R_6)^T$ it can get comprehensive evaluation matrix as following :

$$R_2^{'} = \begin{pmatrix} 0.45 & 0.35 & 0.45 & 0.45 \\ 0.1 & 0.15 & 0.1 & 0.1 \\ 0.15 & 0.2 & 0.2 & 0.1 \\ 0.3 & 0.3 & 0.25 & 0.35 \end{pmatrix}$$

Fuzzy evaluation vector $S_2^{'} = (0.413,\ 0.105,\ 0.172,\ 0.221)$, and it has:

$$M_2 = \max(S_1, S_{2,} \cdots, S_n) = 0.413$$

From above research result, it is clear: on a whole, regarding beautify shape, free one's mind, social communication, regulate one's life such four kinds of benefits to residents physique and psychology, free one's mind is upmost advantage in participating in community activity, because no matter residents in which position, from which regions, after one day tired life, psychology is relative depressed, and these depressed moods are to blame that leads to diseases, therefore it needs some groups social activities to reduce its injury on body.

CONCLUSION

The paper firstly researches on Chinese community collective activities participation age group distribution, gender distribution, income level, gets that community collective activity is one of square fitness main forms, with each age groups of residents understanding on square collective activities, people that around 40 years old that participate in community collective activities have grown to 60%, and from which most people are people of steady works and steady income, which conforms to Chinese residents have large pressures in the age group and need to relief pressure such practical status.

Secondly, on the basis of correlation analysis, utilize fuzzy comprehensive evaluation method, analyze beautify shape, free one's mind, social communication, regulate one's life such four kinds of benefits that participation in community activities bring into residents, then by comparing the two fuzzy evaluation vectors and collective activity benefits to residents physical and psychological health, and then gets that community collective activities mainly let residents to free their mind, and make them feel more pleasure.

Finally it gets China should increase publicity of collective activities as square dance, setting-up exercise, Dayangge and others, let more Chinese residents to participate in them, improve Chinese whole residents' physical quality, and provides precious opinions for China building harmonious socialism.

REFERENCES

[1] Liu Bao, Hu Shan-Lian, Xu Hai-Xia, Gao Jian-Hui; Indices of the Equality of Essential Public Health Services in China, Chinese Journal of Health Policy, **2(6)**, 13-17 **(2009)**.

[2] Zhang Da-Chao, Li Min; Studies on Evaluation Index System of Public Sports Facilities Development Level in China, China Sport Science, **33(4)**, 3-23 **(2013)**.

[3] Cai Jing-Tai, Fan Bing-You, Wang Ji-Shuai; A Survey of Residents' Satisfaction Degree for Urban Public Sport Services, Journal of Beijing Sport University, **6**, **(2009)**.

[4] Wang Guo-Hong, Zhang Wen-Hui; Construction of the Evaluation Index System of City Community Sports-Taking Shanghai as an Example, Journal of Chengdu Physical Education Institute, **36(2)**, **(2010)**.

[5] Zhang Jie, Wu Ying; The Evaluation Index System of Extracurricular Sports Activities in Secondary Schools in Shanghai under the Background of "Sunshine Sports", Journal of Shanghai Physical Education Institute, **6**, 80-82 **(2012)**.

[6] He Ying, Xu Ming; Study on Evaluating System of Sports Consciousness of Community Residents in Southwest Cities, Journal of Chengdu Physical Education Institute, **33(2)**, 43-45 **(2007)**.

[7] He Ying, Xu Ming; Theoretical and Empirical Study on Evaluation Mode of Sports Service Satisfaction Degree in City Community, Journal of Wuhan Institute of Physical Education, **41(11)**, 40-42 **(2007)**.

[8] Chen Yang, Ma Ge-Sheng; An Empirical Study on Community Sports Service Residents' Satisfaction Index Model, China Sport Science and Technology, **45(4)**, **(2009)**.

[9] He Ying, Xu Ming; Theoretical and Empirical Study on Evaluation Mode of Sports Service Satisfaction Degree in City Community, Journal of Wuhan Institute of Physical Education, **41(11)**, 40-42 **(2007)**.