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SPSS variance analysis-based teenager physical health promoting strategy research

Ling Chen[1], Wenbo Zhou[2], Chao Yu[1], Feng Shen[2]*

[1]Department of Physical Education, Hubei University of Automobile Technology, Shiyan 442002, Hubei, (CHINA)

[2]Affiliated Dongfeng Hospital, Hubei University of Medicine, Shiyan 442002, Hubei, (CHINA)

ABSTRACT

Teenager physical health status is a reflection of national comprehensive strength, is also topic of people common concern. Teenager physical health status is closely related to sports, however physical health includes three aspects; they are respectively strength quality, flexibility quality and endurance quality. In numerous sports events, sports events quality that can be promoted is fixed. The paper uses correspondence analysis to work on solving sports ways and promoting qualities relations. The obtained quality is that the most ideal sports event to improve "flexibility quality" is "aerobics"; the most ideal sports event to improve "endurance quality" is "basketball", the most ideal sports event to improve "strength quality" is "martial arts". © 2014 Trade Science Inc. - INDIA

KEYWORDS

Physical health;
Correspondence analysis;
Sports event;
Improve quality.

INTRODUCTION

Teenager is the main force of motherland, is the future of nation. Teenager health growth not only is aspiration of parents but also is expectation of motherland. With the incoming of information era, teenager has gradually had a crush on electronic products. Due to lack of sports exercise, their physical quality and psychological quality are seriously affected. In recent years, teenagers have appeared more and more health issues, such as nearsightedness, obesity, anemia and other health problems. In city, teenagers' nearsightedness proportions have always been higher. In village, teenagers' nearsightedness proportions have being constantly increased. With people living standards improvement, together with parents dote on children, obesity has become the common diseases of Chinese teenagers. Thereupon, it causes teenagers diabetes, coronary heart diseases and hypertension so on diseases. Though China increases national strength, solves the problem of feeding and clothing people, physical health has become problems in teenager growth process that to be solved.

As early as 1989, comrade Wu Bang-Guo pointed out in the speech of social environment and children growth seminar opening ceremony, elder generation of proletariat revolutionaries quite care for teenagers' growth. Deng Xiao-Ping has ever seriously put forward that it should cultivate teenagers into qualified builders and successors of socialist causes, he hope that national teenagers aspire to become people with thought, morality, knowledge and physical strength.

Sports game is a kind of relative old sports. It has important significances in promoting teenager physical strength, intelligence, psychological endurance ability

and team spirits cultivation. Of course, nowadays social competitive pressure is constantly increasing; children learning pressures are also increasing. Therefore teenagers' sports exercising time is not abundant. In fact, the most important cause is that teenagers lacking of exercise defective impacts on healthy growth hasn't attracted patriarch, school or event national sufficient attentions. National comprehensive strength promotion cannot do without teenagers' healthy growth. Teenagers' health growth even cannot do without physical exercise. In order to attract people enough attentions, the paper will introduce data, diagrams, intuitional deeply expresses teenagers' physical health status.

MODEL ESTABLISHMENT

By recently investigation, it finds that teenagers' physique is declining by year. Therefore, teenagers' physical health problems have attracted people's concern. Physique includes endurance quality, strength quality and flexibility quality. What on earth is the status that sports impact on corresponding qualities has become key points in research, relative hot sports events are as Figure 1.

Figure 1: Schematic diagram of part of sports

Data processing

The paper's data is from "University students personalized health promotion research", processing result is as TABLE 1.

TABLE 1: Each factor data-oriented schematic

Physical quality	Sports events
Strength quality 1	Football 1
	Basketball 2
	Volleyball 3
Flexibility quality 2	Tennis 4
	Badminton 5
	Aerobics 6
Endurance quality 3	Taekwondo 7
	Martial arts 8

TABLE 2 : Sports event promotion of physical quality

Events	Endurance quality	Flexibility quality	Strength quality
Football	0.81	0.68	0.36
Basketball	0.75	0.82	0.37
Volleyball	0.49	0.67	0.44
Tennis	0.61	0.72	0.42
Badminton	0.69	0.59	0.45
Aerobics	0.63	0.56	0.47
Taekwondo	0.44	0.54	0.85
Martial arts	0.33	0.45	0.66

Factor digitization

Consult relative documents, it can get centesimal

TABLE 3 : Physical quality, sports events and corresponding performance numerical values table

Physical quality	Sports events	Corresponding performance (centesimal system)
1	1	91
1	2	91
1	3	93
1	4	92
1	5	92
1	6	92
1	7	93
1	8	94
2	1	92
2	2	91
2	3	92
2	4	92
2	5	92
2	6	93
2	7	93
2	8	93
3	1	94
3	2	94
3	3	93
3	4	94
3	5	93
3	6	93
3	7	91
3	8	92

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system achieved performance that reflects one physical quality test item is y, quantitative development demand in the physical quality is x, then it has relationship as following:

$$y = 100 - 10\sqrt{x} \quad (1)$$

By formula (1) calculating, it can get y value as following TABLE 3 show.

Take TABLE 3 as original data, use correspondence analysis, and find out which sports improve which physical quality.

Correspondence analysis theory

Correspondence analysis also calls correlation analysis, $R-Q$ type factors analysis. It uses interactive summary table constructed according to qualitative variable by analyzing to reveal variables relations.

At first, cross-column table formation and probability matrix P calculation

Use two qualitative variables to establish cross-column table, it generates matrix $X\ (r \times c)$ result as following:

$$X = \begin{bmatrix} x_{11} & x_{12} & x_{13} & \cdots & x_{1c} \\ x_{21} & x_{22} & x_{23} & \cdots & x_{2c} \\ x_{31} & x_{32} & x_{33} & \cdots & x_{3c} \\ \cdots & & & & \\ x_{r1} & x_{r2} & x_{r3} & \cdots & x_{rc} \end{bmatrix}$$

Among them, line variable number of categories is r, column variable number of categories is c, and $x_{ij} > 0$.

Standardize matrix X into $r \times c$ matrix P, result is as following:

$$P = \begin{bmatrix} p_{11} & p_{11} & p_{11} & \cdots & p_{11} \\ p_{11} & p_{11} & p_{11} & \cdots & p_{11} \\ p_{11} & p_{11} & p_{11} & \cdots & p_{11} \\ \cdots & & & & \\ p_{11} & p_{11} & p_{11} & \cdots & p_{11} \end{bmatrix}$$

Among them, $P_{ij} = \dfrac{x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_{ij}}$, is every unit frequency total percentage. Therefore, P matrix represents relative data about proportion.

Secondly, take matrix P as evidence to define data point coordinate.

Regard matrix P line r as r pieces of samples, and regard r pieces of samples as c dimensional space r pieces of data point, and each data point coordinate is defined as:

$$z_{i1}, z_{i2}, z_{i3}, \cdots, z_{ic}\ (i = 1,2,3,\cdots r)$$

$$Z_{ij} = \frac{p_{ij}}{\sum_{k=1}^{c} p_{ik}\sqrt{\sum_{k=1}^{r} p_{kj}}}\ (i = 1,2,\cdots,r;\ j = 1,2,3,\cdots,c)$$

Every data point coordinate is a relative data, on the basis of each unit total percentage, take column and line distributed proportions into consideration. If two data points distance is relative near, then it shows line vector corresponding two classifications frequency distribution in all categories of line vector has no significant difference; otherwise, it will has significant difference.

Handle with matrix P in the same way, method is as above.

Then respectively make dimension reduction on line variable and column variable classification.

Line variable classification dimension reduction processing method is the same as column variable classification dimension reduction processing method, take column variable as an example to discuss as following:

(1) Regard matrix P column c as c pieces of variables, and calculate c pieces of variables covariance matrix, the matrix is using A to express. Therefore it proves the i variable and the j variable covariance matrix s:

$$\sum(a_{ij})$$

$$a_{ij} = \sum_{k=1}^{r} z_{ki} z_{kj}$$

And record as $A = Z'Z$.

(2) Start from A matrix; calculate A matrix feature root $\lambda_1 > \lambda_2 > \cdots > \lambda_k$, $0 < k \le \min\{r, c\} - 1$ as well as its corresponding feature vector $\mu_1, \mu_2, \cdots, \mu_k$.

(3) With cumulative variance contribution ration as evi-

dence, it defines final feature root extracting number m (in general m value is 2), calculate corresponding factor load matrix F, that:

$$F=\begin{bmatrix} u_{11}\sqrt{\lambda_1} & u_{12}\sqrt{\lambda_1} & \cdots & u_{1m}\sqrt{\lambda_m} \\ u_{21}\sqrt{\lambda_1} & u_{22}\sqrt{\lambda_2} & \cdots & u_{2m}\sqrt{\lambda_m} \\ \cdots & & & \\ u_{c1}\sqrt{\lambda_1} & u_{c2}\sqrt{\lambda_2} & \cdots & u_{cm}\sqrt{\lambda_m} \end{bmatrix}$$

Among them factor load is column variable one category load in one factor, it reflects their correlations.

Finally, draw line variable and column variable classification corresponding distribution Figure 2.

Analyze SPSS computing results

From corresponding TABLE 4, it is clear that 'physical quality' and 'sports event' the two variables cross table. 'Effective boundary' represents corresponding line or column individual cases distributed totals. From above table, it is clear that basketball corresponding sports performance at least is 276, and martial arts corresponding sports performance at most is 279. But from corresponding table, it still cannot see sports event corresponding performance and physical quality relations.

In above TABLE 5, every cell provides corresponding cross table the cell frequency proportion in the line individual cases tables(Such as:" strength quality" and " endurance quality"respectively have 12.7%and 12.4% sports event "martial arts"). "Effective boundary" represents the line percentages totals. "Quality" represents the column individual cases number proportion in total individual cases number.

Column simple TABLE 6 and line simple TABLE 6 analyze similarly.

TABLE 7 presents correspondence analysis statistical abstract table. Correspondence analysis is to use less dimensions to express variables relations as much as possible, however abstract table provides maximum dimension information to discover every dimension contribution. And in this correspondence analysis, it defines maximum dimension in this way: active column variable classified number (three classes) minus 1 that is two dimensions. 'Inertia' is similar to feature value, is indicator that measure and explains data mutation ability. By TABLE 7, it is clear that the first dimension shows most mutation: 0.906, the second dimension is orthogonal to the first dimension, it gets rest most part:0.094, the result is above 0.5%, therefore, only need to do two -dimensional analysis.

From correspondence analysis scattering Figure 2, it is clear: it is a scatter figure that provides line score and column score in two dimensions, shows category and samples subtle relations by diagram forms. Line point gets closer to column points, which expresses the relation gets closer. As: Dimension 2 distinguishes "flexibility quality" from"endurance quality" and"strength quality". Symmetric normalization method is relative easier to observe " sports event" and " physical quality" relations, the most ideal sports event to improve "flexibility quality" is "aerobics"; The most ideal sports

TABLE 4 : Correspondence table

Physical quality	Sports event								
	Football	Basketball	Volleyball	Tennis	Badminton	Aerobics	Taekwondo	Martial arts	Effective boundary
Strength quality	91	91	93	92	92	92	93	94	738
Flexibility quality	92	91	92	92	92	93	93	93	738
Endurance quality	94	94	93	94	93	93	91	92	744
Effective boundary	277	276	278	278	277	278	277	279	2220

TABLE 5 : Line simplified table

Physical quality	Sports event								
	Football	Basketball	Volleyball	Tennis	Badminton	Aerobics	Taekwondo	Martial arts	Effective boundary
Strength quality	.123	.123	.126	.125	.125	.125	.126	.127	1.000
Flexibility quality	.125	.125	.125	.125	.125	.126	.126	.126	1.000
Endurance quality	.126	.126	.125	.126	.125	.125	.122	.124	1.000
Quality	.125	.124	.125	.125	.125	.125	.125	.126	

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TABLE 6: Column simple table

Physical quality	Sports event								
	Football	Basketball	Volleyball	Tennis	Badminton	Aerobics	Taekwondo	Martial arts	Quality
Strength quality	.329	.330	.335	.331	.332	.331	.336	.337	.332
Flexibility quality	.332	.330	.331	.331	.332	.335	.336	.333	.332
Endurance quality	.339	.341	.335	.338	.336	.335	.329	.330	.335
Effective boundary	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	

TABLE 7 : Abstract output table

Dimension	Singular value	Inertia	Chi-square	Sig.	Inertia proportion		Confidence singular value	
					Explanation	Accumulation	Standard deviation	Correlation 2
1	0.009	0.000			0.906	0.906	0.021	0.000
2	0.003	0.000			0.094	1.000	0.021	
Total		0.000	0.184	1.000	1.000	1.000		

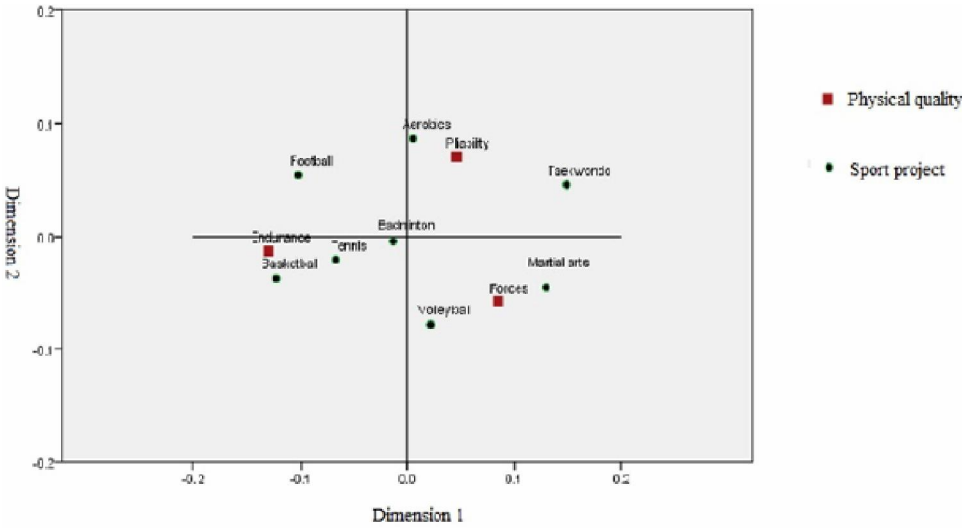

Figure 2 : The point of row and column standardization of symmetry

event to improve "endurance quality" is "basketball", the most ideal sports event to improve "strength quality" is "martial arts".

CONCLUSION

Correspondence analysis most prominent feature is that can simultaneously make sample and variable into a same piece of figure, and intuitional express samples main kinds and their attributes in the Figure. Besides, correspondence analysis doesn't need to carry out factor selection ad factor axis spinning, it can make intuitional classification on samples from factor load figure, and can instruct classification main factors and classification evidence, and it has obvious advantages in case that variables number and variable values categories are relative more. The model uses computer statistical analysis software SPSS to carry on, operability is strong, obtained result has rationality, which has certain reference values.

By analysis, the paper gets the conclusion: the most ideal sports event to improve "flexibility quality" is "aerobics"; the most ideal sports event to improve "endurance quality" is "basketball", the most ideal sports event to improve "strength quality" is "martial arts". With the conclusion as evidence, it can make different physical exercise plans with different physiques teenagers, which is helpful for rapidly improv-

ing teenagers' physical health status.

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