The R Cluster Matrix Analysis of Physique Characteristics of Kazak Students in China

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Abstract. Object: R cluster matrix analysis is used in this research which will explore the physique characteristics of kazak students, and provides the rational theory of the reform of physical education in minority areas of china. Method: we used the R cluster matrix analysis to build the model of physique index of kazak students, then discussed the difference of physique characteristics between the kazak and ethnic han students. Results: The R cluster matrix of kazak students divided into two types,which are the body function and endurance quality, proportion of height and weight with speed and physical strength, but the male students of kazak are heavier, and have advantage in physical strength, endurance within the same height. The female students of kazak are also heavier, and low in proportion of vital capacity and weight, physical strength, speed, endurance in the same height. Conclusion: because of physique characteristics of male kazak students, the course of physical education should help enhance the pliable and sensitive capability, which can let their body form, physical function and movement capability more healthy. And for female kazak students, during the physical education class, the teacher should pay more attention in the quality of strength, endurance, speed, flexibility, agility, and those can enhance the body function, and also can make female kazak students more healthy.

Introduction

The research of physique characteristics can play an important role in athletes selection, traditional sports development and enhance the physical function of minority students[1-2]. This research explored the physique characteristics of Kazak students, and provides the rational theory of the reform of physical education in minority areas of china.

Object and Method of Research

Research Object. We selected 370 university Kazak students between 19-22 years old, 122 male students, 248 female students, and also han students between 19-22 years old,532male sudents, 2092 female students, they are all from yili Kazak Autonomous Prefecture of china.

Research Method.

The test of Physique Index.

(1)automatic height and weight measurement instrument measuring range:0 -999.9s sharpness of separation:0.1s;accuracy of measurement: 0.1%FS

(2)vital capacity measurement instrument measuring range: 0 -9999ML sharpness of separation: 1s;accuracy of measurement: 0.5%FS

(3) test of LCSPFT Grip strength [kg] for males, Sit-ups for females, men's 1000m, women's 800m
Derived Indicators of Physique Characteristics.

(1)The derived indicators of morphology and physique function the index of weight(kg)/height(cm)×1000, the index of vital capacity(m1)/weight(kg)

(2)The derived indicators of morphology and body condition

male: height/50-meter running, vital capacity(m1)/1000-meter running, Grip strength[kg]／weight[kg]

female: height/50-meter running, vital capacity(m1)/800-meter running, sit-ups[kg]／weight[kg]

(3)The derived indicators of morphology and body condition and body function

male: Quetelet /grip strength, quetelet/50-meter running, vital capacity/weight/1000-meter running
female: Quetelet/sit-ups, quetelet/50-meter running, vital capacity/weight/800-meter running

Statistics.

The Statistics of Cluster Matrix of Derived Indicators.

The software of SPSS16.0 is used to do R cluster matrix analysis and calculate the correlation coefficient matrix of relative index, then describe the kazak students physical characteristics.

The Statistics Description of Physical Characteristics.

We used independent samples t test and expressed as $\overline{x}$ ±S.

Result

The Statistics Results of Physical Characteristics .

Tab 1. The results of physical characteristics index

physical index		Male n=122 $\overline{x} \pm S$	Female n=248 $\overline{x} \pm S$
1. weight		68.01±9.83	54.03±4.73
2. height		173.08±6.10	161.79±4.73
3. vital capacity[C.C]		4264.50±660.36	2716.50±440.15
4. Gripstrength(male)		45.07±9.74	
5.sit-ups(female)			28.72±10.25
6. 50-meter running[S]		7.48±1.09	9.37±0.87
7.1000 meter running(male)		227.02±30.29	
8.800-meter running(female)			242.29±17.94
9.the index of weight(kg)/height(cm)×1000		392.81±53.67	333.74±32.36
10.the index of vitalcapacity(m1)/weight(kg)		63.59±11.43	50.71±9.05
11. Grip strength[kg]／weight[kg]		0.67±0.12	
12.sit-ups[kg]／weight[kg]			0.54±0.19
13. height/50-meter running		23.55±3.08	17.40±1.67
14.vital capacity(m1)/1000-meter running(male)		19.18±4.07	
15.vital capacity(m1)/800-meter running(female)			11.31±2.27
16. weight/height／Grip strength(male)		8.94±1.85	
17. weight/height /sit-ups(female)	15.91±20.90		
18. weight/height /50-meter running		53.44±0.90	35.93±4.90
19. capacity/weight/1000-meter running(male)		0.28±0.07	
20.capacity/weight/800-meter running(female)		0.21±0.04	

According to table 1,from number1 to number8 are the index of physical characteristics, number 9 is the derived indicators of physique characteristics, number 10 is the derived indicators of respiratory function,number11 and number 12 are the derived index of the relationship between strength quality and physical quality, and it reflect the influence of physical quality on strength quality. Number 13 is the derived index of the relationship between height and speed quality, number14 and number 15 is the derived index of the relationship between capacity and endurance quality, number 16 and number 17 reflect the effect of weight/height on strength quality, number 18 reflects the effect of weight/height on speed quality, number 19 and number20 reflect the effect of capacity/weight on endurance quality.

The Correlation Coefficient Matrix of Kazak Male Students.

Tab 2. Case processing summary

Cases					
Valid		**Missing**		**Total**	
N	Percent	N	Percent	N	Percent
122	100.0%	0	.0%	122	100.0%

Tab 3. Relative index matrix of male kazak students

Relative index	1	2	3	4	5	6	7	8
1.weight/height	1	-0.551	-0.419	-0.05	0.144	0.368	0.708	-0.419
2.vital capacity/weight		1	0.394	-0.24	0.544	-0.395	-0.405	0.821
3.Grip strength/weight			1	-0.102	0.089	-0.0941	-0.368	0.330
4.height/50-meter running				1	0.130	0.053	0.674	0.105
5.vital capacity/1000-meter running					1	0.171	0.167	0.813
6.weight/height / Grip strength						1	0.332	-0.347
7.weight/height /50-meter running							1	0.218
8.capacity(m1)/weight(kg) /1000-meter running								1

According to table 3, the correlation coefficient matrix of kazak male students, number 1 and number 7 are highly correlated, it means that weight/height plays an important role in the performance of 50-meter running, number 2 and number 8 are highly correlated, it means that the vital capacity/weight index plays an important role in the performance of 1000-meter running, number 5 and number 8 are highly correlated, it means that the vital capacity/1000-meter running and capacity(m1)/weight(kg) /1000-meter running have the same meaning, and number1 and number 2, number 1 and number 3 have negative correlation, number 2 and number 7, number 4 and number 7 have positive correlation.

Tab 4. The final result of R cluster matrix of male kazak students

	2、8、5、3	1、7、6、4
2、8、5、3	1	0.238
1、7、6、4		1

According to table4, matrix of relative index of male kazak students are divided into two categories:

1. Body function and endurance quality: vital capacity/weight and 1000-meter running

2. Quetelet index and the quality of speed and strength: weight/height and 50-meter running, weight/height and grip strength.
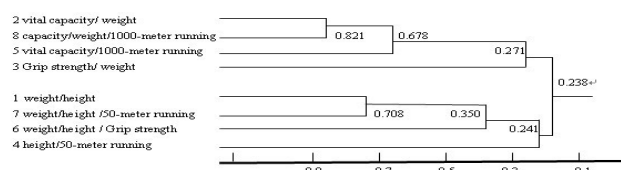

Fig 1. Clustering diagram of relative index matrix of male kazak students

To sum up, table3, table4, and graph1 expressed and cluster process of relative index matrix of male kazak students.

The Correlation Coefficient Matrix of Kazak Female Students.

Tab 5. Case processing summary

Cases					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
248	100.0%	0	.0%	248	100.0%

Tab 6. Relative index matrix of female kazak students

Relative index	1	2	3	4	5	6	7	8
1.weight/height	1	-0.46	-0.227	-0.115	0.135	0.139	0.737	-0.365
2.vital capacity/weight		1	0.185	-0.034	0.732	-0.163	-0.271	0.930
3.sit-ups/weight			1	-0.128	0.104	-0.587	-0.052	0.223
4.height/50-meter running				1	0.283	0.171	0.724	0.162
5.vital capacity/800-meter running					1	0.139	0.269	0.857
6.weight/height /sit-ups						1	0.022	-0.180
7.weight/height /50-meter running							1	0.117
8.capacity/weight/800-meter running								1

According to table 6, the correlation coefficient matrix of kazak female students, number 1 and number 7 are highly correlated, it means that weight/height plays an important role in the performance of 50-meter running, number 2 and number 8 are highly correlated, it means that the vital capacity/weight index plays an important role in the performance of 800-meter running, number 5 and number 8 are highly correlated, it means that the vital capacity/800-meter running and capacity(m1)/weight(kg) /800-meter running have the same meaning. In addition, number 1 and number 2, number1 and number 3 have negative correlation, number 2 and number 7, number 4 and number 7 have positive correlation.

Tab 7. The final result of R cluster matrix of female kazak students

	2、8、5、3	1、7、4、6
2、8、5、3	1	0.138
1、7、4、6		1

According to table7, matrix of relative index of female kazak students are divided into two categories:

1. Body function and endurance quality: vital capacity/weight and 800-meter running.

2. Quetelet index and the quality of speed and strength: weight/height and 50-meter running, weight/height and sit-ups.

2 vital capacity/ weight
8 capacity/weight/800-meter running
5 vital capacity/800-meter running
3 sit-ups/ weight

1 weight/height
7 weight/height /50-meter running
4 height/50-meterrunning
6 weight/height /sit-ups

0.93   0.795
0.171
0.138
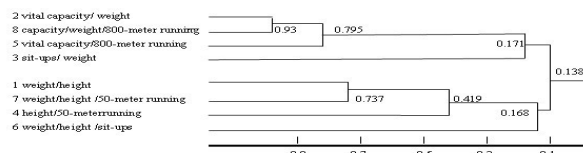0.737   0.419
0.168

0.9   0.7   0.5   0.3   .1

Fig 2. Clustering diagram of relative index matrix of female kazak students

To sum up, table6, table7, and graph2 expressed and cluster process of relative index matrix of male kazak students.

Analysis and discussion

The Comparison of Physique Characteristics between the Students of Han Nationality And Kazak. From table 8, we can see that weight, vital capacity of male kazak students are higher than male han students（P＜0.01）,but in female students, the weight of female kazak students are higher than female han students（P＜0.01）,and vital capacity lower than female han students（P＜0.01）.

Tab 8. Physique characteristics between the students of han nationality and kazak($\bar{x}$ ±S)

sex	N	nationality	height[cm]	weight(kg)	Vital capacity
male	122	kazak	173.08±0.55	68.01±0.89	4264.50±59.79
	532	han	172.61±0.24	64.95±0.40	4136.40±24.79
		t	0.78	3.12	1.98
		P	>0.05	<0.01	<0.05
female	248	kazak	161.79±0.30	54.03±0.37	2716.50±27.95
	2092	han	161.36±0.12	52.89±0.13	2805.30± 9.11
		t	1.19	2.78	3.02
		P	>0.05	<0.01	<0.01

The Comparison of Derived Body Function and Physical Index between the Students of Han Nationality And Kazak. From table 9, we can see that the index of weight/height of male kazak students are higher than male han students（P＜0.01）,and the vital capacity/weight of female kazak students are lower than female han students（P＜0.01）.

Tab 9. The comparison of derived body function and physical index between the students of han nationality and kazak($\bar{x}$ ±S)

sex	N nationality	weight(kg)/height(cm)×1000	vital capacity(ml) / weight(kg)
male	122 kazak	392.81±4.86	63.59±1.03
	532 han	375.87±2.11	64.60±2.11
	T	3.19	0.88
	P	<0.01	>0.05
female	248 kazak	333.74±2.05	50.71±0.57
	2092 han	327.34±0.73	53.49±0.19
	T	2.94	4.63
	P	<0.01	<0.01

The Comparison of Physique Index between the Students of Han Nationality And Kazak. From table 10, we can see that grip strength and 1000-meter running of male kazak students are take more advantage than han students（P＜0.05）,and the sit-ups,50-meterrunning,800-meter running of female han students are take more advantage than kazak students （P＜0.01）.

Tab 10.The comparison of physique index between han nationality and kazak students （$\bar{x}$ ±S）

sex	N	nationality	male. grip strength[kg] female. sit-ups	50-meter running[S]	male.1000-meterrunning[S] female.800-meter running[S]
male	122	kazak	45.07±0.72	7.48±0.10	227.02±2.74
	532	han	43.56±0.31	7.40±0.31	243.91±1.28
		t	2.01	0.25	2.28
		P	<0.05	>0.05	<0.01
female	248	kazak	28.72±0.65	9.37±0.06	242.29±1.14
	2092	han	32.92±0.18	9.21±0.02	234.73±0.41
		t	6.27	2.54	6.25
		P	<0.01	<0.01	<0.01

The Focus of Education for Kazak College Students. All in all, the male kazak students are take more advantage in strength and endurance, and normal in explosiveness, and the oxygen distribution of the unit weight is lower, but the concentrated position of vital capacity is higher. The female kazak students have no advantage in strength, speed, endurance, and body function, maybe less sports and the eating habits of more milk and meat lead to those physique characteristics. The physique characteristics of female kazak students, all body function such as endurance, vital capacity should be enhanced, and during the physical education class, the teacher should pay more attention in the quality of strength, endurance, speed, flexibility, agility, and those can enhance the body function, and also can make female kazak students more healthy[3-4].

Conclusion

According to the results of R cluster matrix analysis, kazak students are divided into two categories: 1. Body function and endurance quality; 2. Quetelet index and the quality of speed and strength, so during the physical education classes of male kazak students, so during the college physical education, the teacher should pay more attention to the weakness of the physique characteristics, which can make the body function and sports quality better.

References

[1] Ren JJ, Li RN. The research of evaluation score of Chinese students' physical characteristics. China Sport Science, 1997, 17(4):34-38

[2] Yang FZ. The analysis research of physical quality among college students, Sport Science research,1997,18(8):52-57

[3] Yao MX, Zeng ZP, Yang ZC. Research on the Promotion Strategy of Different Exercise Level on College Students' Physique Characteristics and Health. Journal of Beijing Sport University, 2007,23(5):134-139

[4] Study on the Fitness Characteristics of College Students with Different Body Mass Index, Journal of Tianjin University of Sport,2007,14(2):14-18