Research Article

Excellent male swimmer body shape feature T test based on event-group theory

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ABSTRACT

Take 40 excellent male swimmers from one swimming training team as research objects, adopt document, interview and experiments so on, mainly research and analysis excellent male swimmers body shape features in different event-groups with the purpose of providing proofs and help to improve male swimmers scientific body shape training by exploring excellent male swimmers body shape rules in the same group of swimming event. The results show that after making independent samples T testing on different event-groups excellent male swimmers body shape index, swimming event of physique of Dominated Speed-Groups and physique of Dominated Endurance-Groups' male swimmers have significant differences in above index. Among them, excellent male swimmers in physique of Dominated Speed –Groups achieve higher scores that provide important references to physique of Dominated Speed-Groups male swimmers selection.

Key words: Event-group theory, swimmer, body shape, physiological feature

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INTRODUCTION

Human maximum sports potential ability can be predicted through multiple factors, from which body shape features is one of the important judge factors. Only correct prediction can ensure that athletes get good results. Therefore, body shape feature is a very important factor. In sports research fields, the formation and development of event-group training theory system is a huge breakthrough. The theory has already fully broken previous sports items boundary limits to large extent. The theory system fulfills deepen exploration and research on cross-item regularity [1]. It is helpful to make effective distinguish inter items similarities and differences so that can fully understand of essential attributes and fixe rules, and complete transferring among each training way as well as mutual referencing of training methods [2]. Besides, coaches and athletes can make use of advanced events' successful experiences, successfully transfer its advantages to the backward events in the same event-group that can propel other vulnerable sports items to get rid of their continuous fall behind status in developing and improve those [3, 4].

This experiment references event-group training theory, divides swimming events into two kinds that is event of physique of Dominated Speed-Groups and of physique of Dominated Endurance-Groups [5, 6]. According to differences between two kinds, respectively explore and discover swimmer's body shape features. From the perceptive of above two kinds of different event-groups, our country excellent male swimmers body shape features can be found. According to differences in such features, it is helpful to provide scientific guiding on advanced selection in training process, and meanwhile bring its guiding into play. At the same time, results and data in the research is helpful for swimmers same event-groups physical training, provide scientific referencing value to coaches and trainers.

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EXPERIMENTAL SECTION

Research objects:
This research takes 42 excellent male swimmers from ne swimming training team in 2012 as objects. The evidence to data statistic is main data of first subject that swimmers engaged in. According to above two kinds of event-groups, divide 42 people into two groups [5, 7]. First group is swimmers in event of physique of Dominated Speed-Group, they are 14. The second group is 28 people, belongs to swimmers in event of physique of Dominated Endurance-Group (as Table 1 shows).

Table 1: Swimming events classification based on competitive ability's leading factors

category	sub-category	Numbers of objects	Core items	shape factors
Physical Leading	speed	14	50m、100m	＊＊
	endurance	28	400m、800m and 1500m	＊＊

Note：＊＊ stands for great importance.

Research methods:
Documentary method: Use Chinese and English periodical database, search every kinds of Chinese and English documents regarding swimmers physical ability at home and abroad since 2000, and look up relative sports research almanac. By sorting Chinese and foreign documents, discover and acknowledge current status of Chinese and foreign scientific research on swimmers body shape features as well as its research trends. Meanwhile, read largely periodicals and books about sports training, sports measurements as well as sports selections from which provide solid theoretical base for this research and at the same time also offer good thoughts [8-10].

Expert interviews method, on the basis of documents collecting and sorting, get relative important theoretical evidence, then combine with relevant content of this research, design proper interview outline that conform to research plan. The purpose is to learn and confirm swimmers body shape test through interviewing. The interviewees in this research is first-line coaches, swimmers that engaged in swimming training, and famous experts that specially go in for relative theory research in swimming as well as sports administrators. According to interview outline, as well as some open questions, through interviewing with these experts, get fully understanding of our country's excellent swimmers body shape features so that build firm foundation for next research. Make clear with swimmers body shape testing's primary index, and work out proper research plan for next experiment [11].

Experiment test method, according to worked out plan as well as definite research index from above research, make body shape test of 40 excellent male swimmers from training team. Their body test index contains 18 items as following. Such as height, forearm and hand length, chest circumference, waist circumference, hip circumference, upper arm skin fold, sub scapular skin fold, abdomen skin fold, body fat percentage, upper limb length/height *100, finger distances/height *100, lower limb length/height*100, shank length+foot height/height *100, sitting height/height*100, biceps circumference tightness difference/ height*100, chest -1/2 height, weight/height *1000, (shoulder width –hip width)/hip width*height these body shape testing index. The above index including 9 items original index in body shape testing, as well as 9 items index derived from original index. Designing of such index is helpful for incoming experiment test, test data would be the important evidence for analyzing and researching on two kinds of excellent male swimmers body shape. The detailed index type can reference Table 2.

Table 2: Excellent male swimmers body shape testing index constitute

Body shape index	Origin index for testing	Derived index
	height, forearm and hand length, chest circumference, waist circumference, hip circumference, upper arm skin fold, sub scapular skin fold, abdomen skin fold, body fat percentage	upper limb length/height *100,finger distances/height *100, lower limb length/height*100, shank length+foot height/height *100,sitting height/height*100, biceps circumference tightness difference/ height*100,chest -1/2 height, weight/height *1000,(shoulder width –hip width)/hip width*height
Total	9 items	9items

Mathematic statistics method, this method is adopt database analysis method, use Excel 2010 software build relative database with data achieved from testing, then use SPSS11.5 software to make data handling and analyzing of standard deviation, independent T test and other dimensions.

RESULTS AND ANALYSIS

Different event –group's excellent male swimmers body shape features:
Make independent samples T test according to different event-groups excellent male swimmers body shape features

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index (refer Table 3). Through testing results, it can be found that the two kinds of swimmers (Physique leading speed-groups swimming events and physique leading endurance –groups swimming events) have significant differences in chest circumference, waist circumference, abdomen skin fold and sub scapular skin fold index, that is P<0.05. With regard to above indexes, physique leading endurance-group swimmers are lower than physique leading speed-group swimmers.

Table3: l two categories event-groups excellent male swimmers body shape comparison results

body shape index	event-group category	N	average number	standard deviation	Standard error	T value	P value
height	1	14	184.80821	5.61646	5.616451	1.417	0.165
	2	28	181.91912	5.93863	1.164661		
forearm and hand length	1	14	46.61661	1.79183	.517251	1.383	0.175
	2	28	45.75012	1.79806	.352632		
upper limb length/height *100	1	14	44.03831	.74935	.216321	-.027	.979
	2	28	44.04812	1.135972	.222782		
finger distances/height *100	1	14	104.92711	2.102141	.606841	.237	.814
	2	28	104.75471	2.078142	.407562		
lower limb length/height*100	1	14	47.05792	11.069141	3.195391	-1.020	.330
	2	28	50.32520	1.146142	.224782		
shank length + foot height/height *100	1	14	27.86472	7.105511	2.051183	.969	.353
	2	28	25.87252	.720222	.141254		
sitting height/height*100	1	14	53.50963	1.293511	.373412	-.494	.625
	2	28	53.68992	.917622	.179961		
chest circumference	1	14	101.16683	3.719322	1.073672	2.548	.015
	2	28	97.03862	4.995841	.979773		
Waist circumference	1	14	79.75012	4.048013	1.168561	2.419	.021
	2	28	75.80782	4.917473	.964402		
Hip circumference	1	14	91.04183	3.608442	1.041673	1.136	.264
	2	28	89.48092	4.075291	.799272		
biceps circumference tightness difference/ height*100	1	14	1.98093	.426652	.123163	.891	.379
	2	28	1.74072	.883272	.173221		
chest -1/2 height	1	14	8.72661	3.123671	.901732	1.981	.055
	2	28	6.07893	4.172293	.818251		
weight/height *1000	1	14	420.26721	27.130451	8.579403	2.021	.053
	2	28	392.49522	39.038692	8.518941		
(shoulder width –hip width)/hip width*height	1	14	71.07721	40.577661	11.713762	1.384	.175
	2	28	59.46322	10.372753	2.034261		
upper arm skin fold	1	14	8.41682	3.079212	.888892	1.233	.226
	2	28	7.28863	2.394721	.469641		
Abdomen skin fold	1	14	12.91682	5.436212	1.569302	2.220	.004
	2	28	9.23472	2.740361	.537431		
Sub scapular skin fold	1	14	11.20011	2.385943	.68876	2.968	.005
	2	28	8.99632	2.003891	.393002		
Body fat percentage	1	14	11.37011	2.991491	.945992	1.235	.227
	2	28	10.18111	2.252031	.491432		

The number 1 in different event-groups refers to physique leading speed-groups event, while 2 stand for physique leading endurance-group event.

Chest circumference:
The remarkable reflection index of human width and thickness is chest circumference. Because chest circumference can reflect individual body shape and breath organs development conditions to large extent. Many scholars and experts have made deeper research in this field, take scholar Cao Ya-Qin (2004) as example, she points out that due to lots of oxygen would be consumed in swimming, besides water pressures should be bearing, therefore causes heavy burden for respiratory muscle, these factors put forward higher requirements of swimmers thorax muscle. According to independent samples T test, in the aspect of chest circumference index, it can be found that the two kinds of event-groups excellent male swimmers have significant differences(P ＜0.05). Chest circumference of physique leading speed-group event male swimmers is bigger than that of physique leading endurance-group event male swimmers. It gives important hints to physique leading endurance-group event male swimmers selection, they should tend to higher chest circumference swimmers when selecting.

Waist circumference:
Waist circumference is a comprehensive index that reflects total fat and fat distribution, and also is an important factor to reflect human body form features. If swimmers have high waist circumference index, then his muscle would be developed and powerful, that is the key for swimming events. But if the index be too big, waist flexibility

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would be reduced. Through independent samples T test, it can be found that physique leading speed-group event swimmers and physique leading endurance-group event swimmers have significant differences in this index (P＜ 0.05). The results reflect that physique leading speed-group event swimmers is larger than physique leading endurance-group event swimmers on such index. It is the important reference for swimmers selecting, that higher waist circumference index swimmers should be chosen when selecting physique leading speed-group event swimmers.

Abdomen skin fold:

Skin fold measurement not only can get acknowledgement of swimmers fat distribution conditions, but also can make overall total fat deduction according to different part skin fold. Skin fold measurement roughly including three parts, that is upper arm skin fold, sub scapular skin fold and abdomen skin fold's measurements. It is very simple and easier to operate, and helpful for acknowledge of human components constitute. Since too fat or too thin would affect human health, while swimmers body fat tends to lower than common people, and have significant differences in gender as well as its special features. Through independent samples T test, the two event-groups swimmers have significant differences, it reflects that physique leading speed-group event swimmers is higher than physique leading endurance-group event swimmers on such index, such results provides reference to physique leading speed –group event male swimmers selection that is higher abdomen skin fold swimmer should be chosen.

Sub scapular skin fold:

It is strict with swimmers muscle; not only their muscles should have good flexibility and elasticity, but also should ensure thickness of subcutaneous fat. Because only such kind of muscle can ensure lower viscous resistance in swimming process so that helpful for speed increasing. And this kind of muscle has strength, can ensure persistence of swimming and can fight against cold. In documents sorting, it is discovered that some researches indicates body fat of swimmers always thicker than that of other sports item athletes. In addition, research shows that sub scapular skin fold is one of the important ways to deduce the thickness of subcutaneous fat. Then can judge whether swimmer is fat or thin, is helpful for whole body fat content testing. Sub scapular skin fold is regarded as one element to judge whether swimmers are in malnutrition or obesity. In experiment, make further contrasting of physique leading speed-group event swimmers and physique leading endurance-group event swimmers on such index, through independent samples T testing, find that two event-groups swimmers have significant differences on sub scapular skin fold index (P＜0.01), that physique leading speed-group event swimmers are far bigger than physique leading endurance-group event swimmers on sub scapular skin fold index. That provides a very important reference to swimmers selection. When choosing physique leading speed-group event male swimmers in the aspect of sub scapular skin fold aspect, swimmers with thicker such index should be chosen.

CONCLUSION

Design thought of above experiment is utilize event-group training theory as guidance, reference relative training and sports selection theory, firstly make event-group classifications, make detailing under major category as physique leading swimmers be divided into two categories, that are speed and endurance. And adopt multiple research methods, define relative research index, as chest circumference, waist circumference, abdomen skin fold and sub scapular skin fold so on such core index. The results show that after independent samples T testing of different event-groups excellent male swimmers body shape index, physique leading speed-group event male swimmers and physique leading endurance-group event have significant differences in above index. In above index, physique leading speed-group event excellent swimmers get higher scores, which provide important references to physique leading speed-group event male swimmers selection, swimmers with bigger above index should be chosen.

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