RELATIONS OF THE BASIC FEATURES OF THE SAMPLE WITH THE SUCCESS IN FREE CLIMBING

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Abstract

The aim of this paper was to determine relations of the basic features of the sample with the success in free climbing. The research was conducted on 20 male subjects from Serbia, Bulgaria and Rumania competing Naissus route climbing challenge 02 held in 2008 in Jelasnica mountain. On the basis of the obtained results it can be concluded that the basic features of the sample are a good predictor for the success in free climbing. Also, it can be concluded that junior climbers more fit for this season (climbed harder route this season) would be better ranked at the free climbing competition.

***Key words**: basic features of the sample, free climbing*

Introduction

Sports climbing nowadays is a very complex sport with its own terminology and equipment generated after the decades of experimenting. For several years it has been considered the most popular and most attractive "leisure" sport with the biggest increase of membership in the world. (Creasy & all., 1999). In the Balkans area this is relatively new sport so very few researchers have conducted their studies in the area of this extremely complex sport. However, on the international level body of research on this sport and experiments conducted on climbing population is enormous one. To be more precise, regarding success in free climbing were researched in the following studies. Wats, Martin and Durtschi (1993) have measured anthropometric variables in 39 semifinalists in the World cup in sports climbing just before the competition. They have concluded that the elite sports climbers are of short to medium height, have very small percentage of body fat, have medium hand shake strength, and big relation strength-weight ratio when compared to the non-athlete population. When these results are compared with the results of other sports disciplines athletes it is stated that stamina and height-weight relation of the elite sports climbers are similar to the values recognized in long distance runners, marathon runners and ballet dancers, but different from the values found in body builders and elite gymnasts. When compared to elite gymnasts elite sports climbers have bigger ectomorphy (bigger height-weight relations).

In discussion researches claim that bigger ectomorphy is an advantage in climbing due to reduction of total weight. Mermier, Janot, Parker and Swan (2000) have researched physiological and anthropometric parameters connected to sports climbing. The study comprised 44 climbers (24 male and 20 female subjects) of different climbing expertise and different climbing experience. Subjects have climbed two different routes in two days. Routes (11 and 30 meters long), were located on an artificial rock and were so designed to make progressive difficulties from the start to the finish. Marking was administered according to the rules governing competitions in weight climbing. Following anthropometric, demographic and physiological variables were used. Regression analysis was applied to find the results stating that the number of training sessions has significantly influenced the success in mastering these two routes. They have also stated that climber do not have determined and specific anthropometric composition that will enable their better climbing. Binney i Cochrane (2003) have tested a sample of 8 women and 10 men aged 26,9 ±6,2 and 30,1±3,6 , elite sports climbing competitors at the end of four-month competing season. The following was tested: maximal isometric power, crimp grab power (MVC) in relation to the body mass, endurance of crimp grab at 60 and 40 % MVC, specific climbing endurance of the lower arm muscles and body composition. Success in sports climbing was represented by the mean value of the total season result.

The results pointed to the fact that the specific climbing endurance of the lower arm muscles is a key factor in success in mail competitors. Variable that was also a significant predictor was a percentage of body fat in female subjects. (reverse proportion). Other variables were not statistically significant in influencing sports climbing competition success. Binney i Cochrane (2003) have tested climbing trajectory as a global variable of the sports climbing form. The research was conducted in 4 competitions (2 national and 2 international ones) on a sample of 72 competitors, aged 21,9±5,4. Competing climbing form was estimated according to the standings taken at each competition (as a criterion the highest point reached on the rock was taken). By means of digital camera each climbing was recorded and trajectory was drawn with the moves of fixed point on the competitors back in the wrist. Correlations searched were those between competing climbing form and trajectory length. Results have shown that the trajectory length is not a significant predictor of the competing climbing form in sports climbing competitors. Wats, Joubert, Lish, Mast and Wilkins (2003) have investigated anthropometrics of young sports climbers on a sample aged 13, 5 (3, 0) that have given their consent to take part in the investigation.

The following test were applied: height, weight, body mass index, (BMI), hand diameter, bicrystal and biacromial distance of skin folds on 9 anatomic points, lower arm circumference and hand shake firmness. Control group was made of 45 subjects going in for other sports like basketball, cross running, ski cross running, football and swimming. They have concluded that young sports climbers in general have similar anthropometric characteristics as the old ones (comparing with Wats, Martin, and Durtschi, 1993). This includes relatively short built, smaller body mass, small skin folds and high values of hand shake firmness in relation to the body mass. When compared to the athletes, non-climbers of the same age climbers show more linear body type, with narrower shoulders in relation to hips. There are also differences in body composition between the climbers and athletes, non-climbers except in body mass index.

Schweizer and Furrer (2007) have researched correlations of lower arm power and success in sports climbing by means of three different movements of lower arm muscle on 25 recreational climbers (climbers who could climb O.S. 6b+ to 7c and R.P. 7a to 8b+). For the testing sake a special isokinetic device was designed for the estimation of maximal excentric and concentric strength of wrist flexion, flexsion of the proximal interfalangal joint of the middle and index finger, and the movement including both interfalangal joints and metakarpafalangal joints of all fingers. There was no correlation between absolute maximal strength and success in sports climbing. Relative strength, however, in all three tests has statistical significant correlation with climbing difficulty at *Red Point* and *On Sight*, apart from proximal interfalangal flexion and O.S. climbing. Correlation coefficients were highest between R.P. and maximal excentric and concentric strength of wrist flexion. Researchers in the end conclude that of all lower arm muscles the best predictor of the climbing success was concentric flexion of the wrist joint. The aim of the paper is to determine the relations of the basic features of the sample with the success in free climbing.

Methods

The subject sample for this research was drawn from the sports climbing competitors population from Serbia, Bulgaria, and Rumania, all competing on the federal and international level, aged 17 to 35. 20 male subjects were investigated. They took part in Naissus route climbing challenge 02 competition held in 2008 in Jelasnica gorge. Sample comprised all willingly stated competitors. Competition routes for the competition Naissus route climbing challenge 02 (24 routes) and the organization were identified by the author and M.Puletic (one of the best sports climbers in Serbia), organized by PK Naissus from Niš and SPK Gekon from Belgrade, under the auspices of the Ministry of Youth and Sport and the Mountaineering Association of Serbia.

Refereeing and scoring was administered by the educated referees in sports climbing rectified by the Mountaineering Association of Serbia, and observed by the author himself. Scoring rules were taken from the site *www.8a.nu* contain the world list of sports climbers on the natural rocks without on-sight climbing, except for the projects). So as to provide the same chances for fair scoring routes were first explained by the organizers of the referees on the spot. Difficulty levels of routes ranged from VI (5c) and X (8b).

Scoring:

Grade	Points	Style, Score & Bonus points
X+ (8b+)	1150	On Sight (O.S.) – Jump three grades - 5 points
X (8b)	1100	
X- (8a+)	1050	Flash (F) – jumps one grade + 3 points
IX+/X- (8a)	1000	
IX+ (7c+)	950	Second Go (2Go) – +2 points
IX (7c)	900	First ascent (F.A.) – +10 points
IX- (7b+)	850	On Sight (O.S.) – Jump three grades - 5 points
VIII+/IX- (7b)	800	
VIII+ (7a+)	750	
VIII (7a)	700	
VIII- (6c+)	650	
VII+/VIII- (6c)	600	
VII+ (6b+)	550	
VII (6b)	500	
VIII- (6a+)	450	
VI+/VII- (6a)	400	
VI+ (5c+)	350	
VI (5c)	300	
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Variable
General sample parameters
1. Age   AGE
2. Sports experience   SPEX
3. Body height   BH
4. Body mass   BM
5. Body mass index   BMI
6. Hardest climbed route   HCR
7. Hardest climbed route season HCRS
Criterion variable
1. Competition standing   CSTD

Test description:
Hardest climbed route means the score for the hardest climbed route that any subject has climbed in his/her scoring career. This grade is in the form of a number according to the international table of scoring and route grading. Hardest climbed route this season means the score for the hardest climbed route that any subject has climbed that season until the competition. This grade is in the form of a number according to the international table of scoring and route grading. Competition standing comprises sum of 10 hardest climbed routes climbed by a climber in all three competing days. In case the climber did not climb 10 routes, all climbed routes were marked.

Results and discussion

Table 1. Descriptive statistics

Variable	Mean	Min	Max	Range	SD	Error	Skew.	Kurt.
AGE	25.2	17.0	35.0	18.0	4.97	1.11	0.07	-0.48
SPEX	6.4	1.0	18.0	17.0	3.76	0.84	1.37	3.79
BH	181.2	174.0	190.0	16.0	5.05	1.13	0.51	-0.80
BM	71.7	64.0	85.0	21.0	6.74	1.51	0.79	-0.52
BMI	21.9	18.0	26.2	8.2	2.15	0.48	0.08	-0.52
HCR	787.5	300.0	1050.0	750.0	178.35	39.88	-1.03	1.67
HCRS	705.0	300.0	1000.0	700.0	175.39	39.22	-0.07	0.28

Table 2. Correlations

	AGE	SPEX	BH	BM	BMI	HCR	HCRS	CSTD
AGE	1.00							
SPEX	0.72	1.00						
BH	0.15	0.25	1.00					
BM	0.31	0.54	0.19	1.00				
BMI	0.22	0.38	-0.39	0.83	1.00			
HCR	0.35	0.30	0.32	-0.24	-0.42	1.00		
HCRS	0.20	0.18	0.26	-0.41	-0.53	0.93	1.00	
CSTD	0.05	-0.07	-0.31	0.31	0.48	-0.86	-0.89	1.00

Table 3. Relations of the basic features of the sample with the competition standing

Variable	R	Part-R	Beta	Std.Err.	t(12)	p-level
AGE	0.05	0.59	0.35	0.14	2.53	0.03
SPEX	-0.07	-0.10	-0.05	0.16	-0.34	0.74
BH	-0.31	0.25	1.11	1.26	0.88	0.39
BM	0.31	-0.27	-2.03	2.07	-0.98	0.35
BMI	0.48	0.26	2.05	2.23	0.92	0.38
HCR	-0.86	-0.28	-0.32	0.32	-1.00	0.34
HCRS	-0.89	-0.54	-0.68	0.31	-2.20	0.05

R= .9542   R²=0.9106   F(7,12)=17.461   p<0.00002

Analyzing Table 1 showing the results of the central and dispersion parameters of the applied variables of the general characteristics of competitors it can be stated that all results of arithmetic means are valid because standard err. of the arithmetic means in all variables is always more than five times smaller than its own arithmetic means. Values of the basic, central and dispersion parameters of the applied variables in the intervals of the minimal (min) and maximal (Max) results comprise always about 4 or more standard deviations (SD), which enables us to state significant sensibility of all applied tests. There is also optimal skew (symmetry) of distribution in the zones around the arithmetic means (Skew). From the Skewness one can also notice that there is greater number of climbers with longer climbing experience (SPEX) and somewhat smaller number of good results in the variable the most difficult climbed route (HCR). However, Kurtosis (Kurt.) whose value in most variables is significantly smaller than 2,75 means that the test results are largely scattered. This does not come as a surprise because here the sample of subjects contained heterogeneous age representatives.

Only in the variable sports experience one can notice homogeneity of the results. Out of the basic statistical parameters one can also notice that the population out of which the sample was taken is relatively high (mean value 181, 24) which is in contrast with the investigation conducted by Wats & al, (2003). This can indicate towards the agreement with Mermier & all. 2000 who claim that climbers do not have determined anthropometric composition that enables them to climb better. Analyzing matrix of correlation (table 2) it can be concluded that a small number of coefficients is significant on the level of 95% in the range of 0,48 to 0,93.

Discussion

The biggest correlation coefficients have variables hardest climbed rout and hardest climbed route this season (0,93), than hardest climbed rout and hardest climbed route this season with competition standing (-0,89 i -0,86) and body mass index with body mass (0,83). The lowest statistically significant correlation coefficient is between body mass index and competition standing (0,54). In table 3 results of the connection of variable system for the estimation of the basic features of the sample with success in free climbing (competition standing) are shown. By the analysis of the obtained results it can be stated that there is statistically significant connection between system of the basic features of the sample and competition standing (p<0,00002). Connection of the whole system with criterion variable explains very high coefficient of multiple correlation R= 0,95, which in turn explains common variability between system and criterion variable with about 91% (R²= 0,91). Analysis of the regression coefficients of each basic features of the sample shows that there is statistically significant connection of the criterion variable competition standing with age (AGE) with the significance of 0,0264 and the hardest climbed route this season (HCRS) 0,0484. The rest basic features of the sample: sports experience, body height, body mass, body mass index and hardest climbed route, have not statistically significant connection with criterion variable competition standing. On the basis of the obtained results it can be concluded that the basic features of the sample are a good predictor for the success in free climbing. Also, it can be concluded that junior climbers more fit for this season (climbed harder route this season) would be better ranked at the free climbing competition.

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RELACIJE TEMELJNIH ZNAČAJKI UZORKA ISPITANIKA S USPJEHOM U SLOBODNOM PENJANJU

Sažetak

Svrha ovog članka je da ukaže i postavi temelje relacija osnovnih svojstava uzorka entiteta s uspjehom u slobodnom penjanju. Istraživanje je provedeno na 20 muških ispitanika iz Srbije, Bugarske i Rumunjske koji su se takmičili na Naissus penjačkoj ruti climbing (challenge 02) održanom 2008 na Jelasnica gorge. Temeljem dobivenih rezultata zaključeno je kako su osnovna svojstva ispitanika dobar prediktor uspjeha u slobodnom penjanju. Također, može se zaključiti da su omladinci bolje pripremljeni ove sezone (penju težu rutu) pa je za očekivati i njihovu bolju ranking poziciju.

Ključne riječi: *temeljne sposobnosti, slobodno penjanje*