DEPENDENCE OF THE OVERALL RESULT IN THE OLYMPIC TRIATHLON ON THE PERFORMANCE OF INDIVIDUAL EVENTS

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Abstract
The aim of the study was to determine the dependence of the overall result on the performance of individual events. In other words, which stage (event) of the triathlon is the most important in order to achieve the best performance and thus the best ranking. In this paper, we considered all the Olympic triathlons organised by the ITU (World Cup) from 2009 to 2014. From each competition, the 30 fastest competitors according to the valid results were chosen. That included 36 competitions that we could use for our research. Two competitions could not be used due to insufficient number of competitors. The results of our research show that the running event had the highest influence on the competition ranking. An average correlation in the running event was r = 0.87 (p < 0.01). According to Cohen's scale that means a high dependence of results. An average correlation of the individual triathlon events with the overall results shows that neither swimming (correlation coefficient r = 0.31 (p < 0.01)), nor cycling (correlation coefficient r = 0.13 (p < 0.01)) have a deciding influence on the final result.

Key words: *Olympic triathlon, correlation, event results*

Introduction

Triathlon is considered to be one of the younger sports branches. That is why there are still many questions, when it comes to the structure of the sports performance in a triathlon. Its origin dates back to the 1970s. It has been a part of the Olympic programme since 2000. Based on its structure, the triathlon belongs to the endurance sports (Friel, 2014). Triathlon consists of three endurance events (Pupišová, 2013), swimming, cycling and running. There is a linking part between these events and that is called "transition". When it comes to coordination, swimming can be considered the most demanding part. For that reason, and from the point of view of motor learning, it is possible to focus on swimming when beginning the training for a triathlon (Suchý, 2012; Tonhauserová, 2012). Naturally, with a deepening specialization, we must understand the performance structure. Many triathletes try to figure out, which event is the most important in a triathlon, and which one should they devote most of their time to. Therefore our paper analyses the dependence between the performance of individual triathlon events and the final result in the triathlon competition. The correlation between the swimming times and the overall time is much lower or insignificant compared to the correlations of cycling or running. This may be caused by various duration of swimming, cycling and running events for each individual. For example, 1500m of swimming takes about 20 min, 40km of cycling takes more than 60 min, and 10km of running takes about 35 min, which represents the total duration of the competition just under 2 hours for men and above 2 hours for women. That is why approximately 18% of this time is used for swimming, 52% for cycling and 30% for running (Dengel, et al. 1989; Knechtle, et al. 2007).

Landers et al. (2000) and Zinkgraph et al. (1986) used different methodologies, such as competitors' ranking or correlation. They concluded that it is important to have approximately the same amount of swimming, cycling and running in each event with the final times in the finish line. The aim of this paper is to determine the dependence of the overall performance in triathlon on the performance of individual events. We conducted the correlation analysis on the results of the Olympic triathlons organised by the ITU from 2009 to 2014.

Methods

Characteristics of the group
In this paper, we retrospectively evaluated the results from the Olympic triathlons organised by the ITU. We researched a group of the 30 highest placed triathletes in the 36 competitions held between 2009 and 2014. By means of correlation, we put the overall time achieved in the competition and the individual events of the triathlon into direct relationship.

Statistical analysis
We used the IBM® SPSS® Statistic 20 statistical programme to evaluate the results. To evaluate the correlations, we used the Hopkins scale (2006) that deals with the problem of the Cohen's scale and looks for the answer to a question, what lies between 0.5 and 1?.

Based on his research, Hopkins (2006) created a new division of the interpretation of correlation coefficients, which is stated in Table 1 of this paper. He used the Likert scale in his paper, using the word "very", meaning more than "large". The value of 0.9 is the deciding limit for validity.

Table 1 Division of the correlation coefficients

	Correlation
trivial	0.0
small	0.1
moderate	0.3
large	0.5
very large	0.7
nearly perfect	0.9
perfect	1,0

Results

Table 2 Correlation coefficients in the competitions

	Place	Swim (r)	Bike (r)	Run (r)
1	ITU 2009 Tongyeong	0.11	-0.27	0.91
2	ITU 2009 Madrid	0.63	0.45	0.83
3	ITU 2009 Washington	0.53	0.72	0.84
4	ITU 2009 Kitzbuhel	0.23	0.11	0.97
5	ITU 2009 Hamburg	0.23	-0.07	0.93
6	ITU 2009 London	0.27	-0.26	1.00
7	ITU 2009 Yokohama	0.68	0.49	0.90
8	ITU 2009 Gold Coast	0.38	-0.22	0.94
9	ITU 2010 Sydney	0.27	0.04	0.92
10	ITU 2010 Seoul	0.19	-0.22	0.99
11	ITU 2010 Madrid	0.09	0.43	0.82
12	ITU 2010 Hamburg	0.39	-0.28	0.99
13	ITU 2010 London	0.35	-0.43	0.90
14	ITU 2010 Kitzbuhel	0.32	0.21	0.54
15	ITU 2010 Budapest	0.36	-0.34	0.99
16	ITU 2011 Sydney	-0.04	0.05	0.99
17	ITU 2011 Madrid	0.56	0.72	0.47
18	ITU 2011 London	0.65	0.13	0.81
19	ITU 2011 Hamburg	-0.07	0.02	1.00
20	ITU 2011 Beijing	0.42	0.19	0.95
21	ITU 2011 Yokohama	0.58	-0.49	1.00
22	ITU 2012 Sydney	0.23	0.06	0.90
23	ITU 2012 San Diego	-0.17	0.12	0.99
24	ITU 2012 Madrid	0.57	0.68	0.35
25	ITU 2012 Kitzbuhel	0.12	0.04	1.00
26	ITU 2012 Yokohama	0.37	-0.40	0.99
27	ITU 2013 San Diego	0.32	0.25	0.91
28	ITU 2013 Yokohama	0.57	0.68	0.70
29	ITU 2013 Madrid	-0.03	0.75	0.93
30	ITU 2013 Stockholm	0.70	0.64	0.71
31	ITU 2013 London	0.32	0.05	0.88
32	ITU 2014 Auckland	0.26	0.44	0.71
33	ITU 2014 Cape Town	0.04	0.46	0.72
34	ITU 2014 Yokohama	0.15	0.20	0.92
35	ITU 2014 Chicago	0.42	-0.45	0.98
36	ITU 2014 Edmonton	0.22	0.12	0.87
	AVERAGE	0.31	0.13	0.87

We used a total of 36 competition results in our paper. We can see all the correlation coefficients of the individual competitions in Table 2. As can be seen in Table 2, the correlation coefficient for the swimming stage of the triathlon was between r = 0.24 and r = 0.70 *(p < 0.01)*. The coefficient exceeded the value r = 0.5000 *(p < 0.01)* only 7 times. Only 7 cases in 36 showed that from the point of view of division, there is a high probability that swimming played an important part in the overall competition results. In cycling, the value of 0.50 was exceeded only 6 times and the coefficient was between r = -0.49 and r = 0.75, meaning the dispersion is significantly higher than in swimming. In running, we observe a reversed correlation coefficient, which means that only 4 competitions descended below the value of r = 0.50. This means that in 32 cases the results had to be decided in the running event of the competition. The correlation range was r = 0.35 to r = 1.00. An average correlation of the individual triathlon events with the overall result shows that neither swimming (correlation coefficient r = 0.31 *(p < 0.01)*), nor cycling (correlation coefficient r = 0.13 *(p < 0.01)*) have a deciding influence on the final result. In contrast, the influence of running is significant (r = 0.90 *(p < 0.01)*). The correlation coefficient exceeded the value r = 0.9 *(p < 0.01)* in as much as 22 cases. We can regard this as an absolute influence on the overall performance and results in the triathlon. As in the case of statistical dependence, the situation is very similar with the empirical processing. There we can also notice that the differences between the performances are the most noticeable in the running event. In Table 3, we can see that in the observed 36 competitions the difference between the first and the tenth competitor was 15.1 s in the swimming event and 42.8 s in the cycling event. The difference in the running event was 67.9 s (which is precisely the sum of the values from the swimming and cycling events). When comparing the differences between the first and the twentieth (or thirtieth) place, this difference (the sum of the values from swimming and cycling compared with the value from running) was in favour of running, more specifically above 17 s for places 1. to 20. (or above 47 s for places 1. to 30.).

Table 3 Intervals between the individual competitors' rankings in individual triathlon events

	1. - 10.	1. - 20.	1. - 30.
Swim (s)	-15.11	-34.10	-60.53
Bike (s)	-42.78	-67.06	-99.61
Run (s)	-67.89	-118.42	-207.67

The rankings defended by the competitors prove this as well. For example in the 2014 finals in Edmonton the competitor who swam out the first finished twenty-seventh with the overall loss of 2.29 min compared with the winner. In contrast, the competitor who finished second swam out nineteenth with the loss of 44 s. However, in the finish, he was ahead of the swimming winner by 2.09 min, gaining 2.12 min in the running event.

Conclusions

The results of our research point to the fact that the running event has the deciding influence on the overall result in the Olympic triathlon. Naturally, the fact that the triathlete has to achieve a good performance in the swimming event, as well as in the cycling event is unquestionable. However, if they want to reach the best performance and result, the running performance is the most crucial one. That is why we may ask, whether a young potential triathlete should be trained as a swimmer, who can cycle and run, or rather as a runner, who can cycle and swim. Of course, there is no clear answer to that, but the results of our research indicate that the overall result in the triathlon depends primarily on the performance in the running event.

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OVISNOST PROSJEČNOG REZULTATA U OLIMPIJSKOM TRIATLONU O IZVEDBI POJEDINAČNIH ZADAĆA

Sažetak

Cilj istraživanja bio je utvrditi ovisnost ukupnog rezultata na obavljanje pojedinih događaja. Drugim riječima, koja faza (događaj) u triatlonu je najvažnija kako bi se postigao najbolji učinak, a time i najbolja ocjena. U ovom radu razmatrani su svi olimpijski triatloni u organizaciji ITU (World Cup) od 2009. do 2014. Iz svake konkurencije, 30 najbržih natjecatelja prema važećem rezultatu su izabrani. To uključuje 36 natjecanja koje smo mogli koristiti za naše istraživanje. Dva natjecanja se nisu mogla koristiti zbog nedostatnog broja natjecatelja. Rezultati našeg istraživanja pokazuju da je trčanje imalo najveći utjecaj na konačnu ljestvicu. Prosječna korelacija u tekućem slučaju je r = 0,87 (p <0,01). Prema Cohen skali to znači visoku ovisnost rezultata. Prosječna korelacija pojedinačnih triatlon događaja s ukupnim rezultatima pokazuje da ni plivanje (koeficijent korelacije r = 0,31 (p <0,01)), niti biciklizam (koeficijent korelacije r = 0,13 (p <0,01)) nemaju odlučujući utjecaj na konačni rezultat.

Ključne riječi: *Olimpijski triatlon, korelacije, rezultati susreta*

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