Consequences of swim, cycle, and run performance on the overall result in Olympic-distance triathlon

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Introduction

Olympic triathlon is a multidisciplinary sport that comprises three different modalities (swim, cycle and run) which are conducted in succession. Overall triathlon time consists of the three legs and the two transition times between the three legs. In order to achieve the fastest overall time possible, the times needed for each leg have to be minimized and athletes have to consider the aspect of marginal return when deciding how to use their resources in training and competition (Fröhlich et al., 2008). The purpose of this analysis was to find out which of the three disciplines is of superior significance for overall finishing times and rankings.

Methods

Overall times and rankings as well as rankings and times for each of the three modalities of all athletes who competed in the Olympic-distance triathlon world championships in 2007 (junior women, n = 59, junior men, n = 77, U23 women, n = 30, U23 men, n = 62, elite women, n = 60, elite men, n = 66) were analysed. The distances were as follows: junior women and men: 750m swim, 20km cycle, 5km run; U23 as well as elite women and men: 1500m swim, 40km cycle, 10km run. Because of dropouts, disqualifications etc, the sample was reduced to 354 athletes. By calculating correlations and multiple linear regressions (overall time is calculated as 100 % divided by the times of the three modalities) beta weights for each of the three modalities were calculated. Calculations were carried out for all athletes who participated in the above mentioned competitions as well as for the 20 highest-ranked finishers.

Results

There was a significant correlation between the times of all modalities and overall finishing times for all finishers (all $p < 0.01$): junior women: swim 0.61, cycle 0.84, run 0.84; junior men: swim 0.81, cycle 0.88, run 0.85; U23 women: swim 0.47, cycle 0.66, run 0.83; U23 men: swim 0.47, cycle 0.80, run 0.80; elite women: swim 0.62, cycle 0.83, run 0.83; elite men: swim 0.51, cycle 0.76, run 0.85 (cf. Tab. 1). For the junior athletes the highest beta weights were found for the cycle (beta ≥ 0.50), for the U23 athletes as well as for elite women and men the highest beta weights were found for the run (beta ≥ 0.57) (cf. Tab. 3). When limiting the analyses to the 20 best overall finishers, no significant correlation between modality times and overall finishing times could be found for junior athletes whereas for U23 athletes as well as elite athletes there was a significant correlation between run time and overall time (cf. Tab. 2). The highest beta weights for the 20 best overall finishers were on the run (beta ≥ 0.82) in all subgroups (junior women and men, U23 women and men, elite women and men). Table 3 shows the results of the multiple lineare regressions for women and men as well as for junior and elite triathletes.

Tab. 1: Correlation between the times of all modalities and overall finishing times for all finishers

		Junior women (n = 59)	Junior men (n = 77)	U23 women (n = 30)	U23 men (n = 62)	Elite women (n =60)	Elite men (n = 66)
swim	**r**	0,61	0,81	0,47	0,47	0,62	0,51
	p	0,00	0,00	0,01	0,00	0,00	0,00
cycle	**r**	**0,84**	**0,88**	0,66	**0,80**	**0,83**	0,76
	p	0,00	0,00	0,00	0,00	0,00	0,00
run	**r**	**0,8**4	0,85	**0,83**	**0,80**	**0,83**	**0,85**
	p	0,00	0,00	0,00	0,00	0,00	0,00

Tab. 2: Correlation between the times of all modalities and overall finishing times for the best 20 finishers

		Junior women (n = 20)	Junior men (n = 20)	U23 women (n = 20)	U23 men (n =20)	Elite women (n =20)	Elite men (n = 20)
swim	**r**	0,62	0,65	0,31	0,13	0,65	0,42
	p	0,00	0,00	0,19	0,57	0,00	0,07
cycle	**r**	-0,30	**0,67**	0,49	-0,07	0,31	-0,23
	p	0,19	0,00	0,03	0,78	0,18	0,35
run	**r**	**0,88**	0,26	**0,75**	**0,99**	**0,62**	**0,99**
	p	0,00	0,27	0,00	0,00	0,00	0,00

Tab. 3: Beta weights of the lineare regression between the times of all modalities and overall times

all	**Junior women (n = 59)**	**Junior men (n = 77)**	**U23 women (n = 30)**	**U23 men (n = 62)**	**Elite women (n =60)**	**Elite men (n = 66)**
swim	0,13	0,19	0,24	0,18	0,24	0,10
cycle	**0,56**	**0,50**	0,44	0,54	0,45	0,50
run	0,54	0,48	**0,72**	**0,61**	**0,57**	**0,67**
best 20	**Junior women (n = 20)**	**Junior men (n = 20)**	**U23 women (n = 20)**	**U23 men (n = 20)**	**Elite women (n =20)**	**Elite men (n = 20)**
swim	0,48	0,52	0,31	0,52	0,53	0,36
cycle	0,45	0,67	0,56	0,52	0,46	0,39
run	**0,97**	**0,82**	**0,84**	**0,97**	**0,82**	**0,94**

Discussion and conclusion

Since drafting is allowed in Olympic-distance triathlon races, the run has been upvalued whereas the swim and the cycle have been devalued (Vleck et al., 2006). Except for junior athletes it can be stated that the most decisive factor for winning or not winning an Olympic-distance triathlon is the time needed for the run whereas an athlete`s placing after the swim or the cycle has no prognostic relevance for his or her final placing. Judging from an efficiency-oriented perspective (Fröhlich et al., 2008), triathletes should emphasize training the run rather than emphasizing the swim or the cycle. Considering economic aspects it must be concluded that the common training programs for Olympic distance triathlon should be reconsidered and thought over. Investing such a considerable amount of training time and resources into training the cycle as is commonly done in Olympic distance triathlon training may not be ideal. Shifting resources in favor of running may be beneficial.

References

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