

Talent identification and development in Olympic triathlon: a perspective from Brazilian coaches

Identificação e desenvolvimento de talentos no triatlo olímpico: uma perspectiva de treinadores brasileiros

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Abstract - The knowledge of coaches has been used in research on talent identification and development. The objective was to investigate how Brazilian triathlon coaches identify talents and what is the importance of different factors and indicators for the development of young triathletes. 37 coaches (89% male; 36.2 ± 8.3 years; 43% international competitive level) answered an online questionnaire about anthropometric, physical-motor, technical, tactical, psychological and environmental characteristics. On a scale of 1 (not very important) to 5 (extremely important), coaches indicated to what extent a factor/indicator of sporting potential was important for talent development in triathlon. 45.9% of the coaches perform talent identification, mainly by physical-motor tests and triathlon simulations. In talent development, the physical-motor factor was the most important, followed by the technical, psychological and anthropometric factor, and finally the tactical and environmental factor. Most coaches considered as extremely important the following indicators: determination (70%), aerobic endurance (65%), specific swimming skills (62%), ability to withstand pressure (59%), and efficiency of the cyclic gesture of swimming, cycling, and running (57%). We conclude that Brazilian triathlon coaches identify talents mainly through batteries of tests and triathlon simulations and consider the physical-motor factor the most important for the development of young talented triathletes, but not the only one.

Key words: Aptitude; Athletes; Athletic performance; Talent selection.

Resumo - O conhecimento dos treinadores tem sido utilizado na pesquisa sobre identificação e desenvolvimento de talentos. O objetivo foi investigar como os treinadores de triatlo brasileiros identificam os talentos e qual é a importância de diferentes fatores e indicadores para o desenvolvimento de jovens triatletas. 37 treinadores (89% homens; 36,2 ± 8,3 anos; 43% nível competitivo internacional) responderam um questionário online sobre características antropométricas, físico-motoras, técnicas, táticas, psicológicas e ambientais. Em uma escala de 1 (não muito importante) a 5 (extremamente importante), os treinadores indicaram em que medida um fator/indicador do potencial esportivo era importante para o desenvolvimento de talentos no triatlo. 45,9% dos treinadores realizam identificação de talentos, principalmente por testes físico-motores e simulados de triatlo. No desenvolvimento de talentos, o fator físico-motor foi o mais importante, seguido pelo fator técnico, psicológico e antropométrico, e por fim o fator tático e ambiental. A maioria dos treinadores considerou como extremamente importante os indicadores: determinação (70%), resistência aeróbica (65%), habilidades específicas de natação (62%), capacidade de suportar pressão (59%) e eficiência do gesto cíclico de nadar, pedalar e correr (57%). Conclui-se que os treinadores de triatlo brasileiros identificam talentos principalmente por meio de baterias de testes e simulados de triatlo e consideram o fator físico-motor o mais importante para o desenvolvimento de jovens triatletas talentosos, mas não o único.

Palavras-chave: Aptidão; Atletas; Performance atlética; Seleção de talentos.

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INTRODUCTION

The sports organizations have increasingly invested in applied science, aiming to optimize the identification, selection, and development of talent to obtain competitive advantages¹. Finding talent and transforming them into experts are steps that occur during long-term training, based on a complex interaction of factors related to the individual, the task, and the environment². Our understanding of sporting talent is still limited, and there is a need for further studies, especially in South America and in other sports such as triathlon.

One of the main indicators of the success of a country in the triathlon is the number of athletes who compete at the highest level of performance³. In Brazil, the number of triathletes is growing. It is estimated that 20 thousand athletes practice triathlon in an amateur form sport and professionally⁴. However, the number of Brazilian athletes in the Olympic Games is decreasing. Besides the lack of expressive results, since we do not have a structured national system to develop talented Brazilian triathletes⁵.

The performance determinants of elite triathletes are well known and serve as a basis for talent identification and development programs, such as: age, anthropometric and physiological profile, biomechanical and neuromuscular factors, psychosocial characteristics, competition demands, and tactical strategy⁶⁻¹⁰. However, there are few studies with young triathletes^{11,12}.

The assessment of the sporting potential in young athletes is the first step in the search for talent and is usually done through a battery of tests, performance in competition, subjective assessment by coaches, or a combination of methods¹³. In triathlon, scientific evidence shows that aerobic fitness is one of the most important characteristics in junior triathletes⁸. On the other hand, specific tests show low correlation with performance in competition^{14,15} and youth performance does not explain the future success of triathletes¹⁶. In Spain, in 13- to 17-year-olds, we observed a higher proportion of triathletes born in the first months of the year - a phenomenon known as relative age effect¹². The chronologically older triathletes within the same age category perform better in competition¹² and this has influenced athlete selection.

Considering that motor tests measure only current performance and the selection bias that may occur due to biological maturation effects¹⁷, researchers have investigated the opinion of coaches to estimate the potential of young athletes. Coaches are essential in detecting, motivating, selecting talent, and ensuring the delivery of training¹³. The knowledge of coaches about the determinants of performance has been investigated in various sports¹⁸⁻²⁰ including in triathlon^{15,20}.

For triathlon coaches, variables such as motivation and mental strength, load and stress tolerance, capacity for improvement, and support are more important for performance than physiological and performance variables in specific tests¹⁵, in addition to technical aspects, dedication, and engagement²⁰. However, these studies investigated the determinants of performance and not for career development. Therefore, new studies are necessary to systematize the "coach's eye" and investigate important factors for the development of talented triathletes, especially in the Brazilian context. It is necessary to know if Brazilian triathlon coaches utilize some procedure to identify talents and what factors and indicators they consider important to develop them.

Thus, the objective was to investigate how Brazilian triathlon coaches identify sport talents and what is the importance attributed to factors and indicators that are determinant for the development of young triathletes.

METHODS

Sample

Thirty-seven triathlon coaches participated in the study, being the majority male (89.2%), from the Southeast region (64.9%) and former triathlon athletes, with a mean age of 36.2 ± 8.3 years and with 8.1 ± 6.8 years of experience, being 43.2% of international level - Table 1. The coaches were recruited by convenience and should have at least 1 year of coaching experience in a sport training category. The consent of the coaches was obtained prior to participation in the study. This research is part of the “Projeto Atletas de Ouro®: Multidimensional and longitudinal evaluation on the sporting potential of young athletes”, approved by the Research Ethics Committee of the Federal University of Ouro Preto (CAAE 32959814.4.1001.5150).

Procedures

The data collection was performed through an online questionnaire prepared in Google Forms sent to the coaches by e-mail and/or *WhatsApp*. The questionnaire was composed of 6 factors and 52 indicators of sporting potential, based on previous studies^{15,20} and the battery of tests of the Projeto Atletas de Ouro²¹. The instrument’s content was validated by four experts (university professors, PhDs, and triathlon experts). The following factors were assessed: anthropometric (body mass; height; muscle mass; wingspan; length of lower limbs; biotype), physical-motor (speed; maximal isometric strength of upper limbs; maximal isometric strength of lower limbs; lumbar traction force;

Table 1. Characteristics of Brazilian triathlon coaches (n = 37).

	N	%
Sex		
Male	33	89.2
Female	4	10.8
Age Group		
19 to 29 years	6	16.2
30 to 40 years	21	56.8
>40 years	10	27.0
Region		
North	2	5.4
South	3	8.1
Southeast	24	64.9
Northeast	4	10.8
Mid-West	3	8.1
Experience Time		
Up to 10 years	28	75.7
11 to 20 years	7	18.9
>20 years	2	5.4
Competitive Level		
Internacional	16	43.2
National	14	37.8
State/Municipal	7	19.0
Former Athletes of Triathlon		
Yes	34	91.9
No	3	8.1

maximal dynamic upper limbs strength; maximal dynamic lower limbs strength; upper limbs power; lower limbs power; aerobic endurance; flexibility; anaerobic endurance; agility; balance; reaction time; motor coordination), technical (specific swimming skills; specific running skills; specific cycling skills; procedures within the transition area; hydrodynamics and aerodynamics; cyclic gesture of swimming, cycling and running), tactical (positioning with respect to other competitors (start, swimming, t1 and t2, cycling, etc.); utilization of vacuum; pacing strategy (moments of acceleration, deceleration and constant pace); knowledge about the other triathletes; actions to approach the opponent; supplementation strategy), psychological (self-confidence; ability to withstand pressure; concentration; competitiveness; goal setting; dealing with adversity; trainability; determination), and environmental (having an athlete in the family; early initiation; socioeconomic level; sports practice of the parents; training place/club; academic performance (school); level of physical activity; family support; quantity/time of practice/training; quality of practice/training; experience in competition).

The first part of the questionnaire collected socio-demographic information, academic background, and professional experience as a coach and athlete. In the second part, the coaches were asked about the importance attributed to the different factors for the development of young triathletes, using a scale ranging from (1) not at all important to (5) extremely important. Next, they were to assign an order of factor importance, being (1st) most important to (6th) least important. In the third part, the coaches responded on the importance of each of the indicators of sporting potential, using a scale of (1) not at all important to (5) extremely important. The coaches were also asked about other variables that they considered important. Finally, the coaches were asked whether they use any method to detect talent in triathlon.

Statistical analysis

Descriptive statistics were presented as mean \pm standard deviation and percentages. In order to test for differences in the importance of factors for the development of triathletes, repeated measures ANOVA were utilized, followed by Bonferroni's post-hoc test and 95% confidence intervals for the mean (95% CI). Effect size was assessed by η^2 . The analyses were performed in IBM SPSS software version 24.0 (IBM Corp., Armonk, NY), and a statistical significance level of 5% was adopted.

RESULTS

Almost half of the coaches (45.9%; $n=17$) use some procedure to detect triathlon talents, the most frequent being: batteries of physical-motor tests and triathlon simulations - Table 2.

The importance attributed by coaches to the factors and indicators for the development of young triathletes is presented in Table 3. There was a statistically significant difference in the order of importance attributed by coaches to the factors of sporting potential ($F_{5,158} = 18.711$; $p < 0.001$; $\eta^2 = 0.34$). The physical-motor factor (4.89 ± 1.41) was considered the most important, followed by the technical (4.21 ± 1.20), psychological (3.97 ± 1.28) and anthropometric (3.46 ± 1.61) factors, and then the tactical (2.43 ± 1.38) and environmental (2.03 ± 1.50) factors - Figure 1. For this analysis, the 1st most important factor received the number 6, the 2nd most important factor received the number 5 and so forth.

In Figure 2, we highlight those indicators that the coaches indicated as “extremely important,” among them: determination (70%), aerobic endurance (65%), specific swimming skills (62%), ability to withstand pressure (59%), and efficiency of the cyclic gesture of swimming, cycling, and running (57%), concentration (54%), knowing how to deal with adversity (54%), self-confidence (51%), and family support (51%).

Table 2. Procedures utilized by coaches to identify talents in triathlon (n = 17).

Procedures	N	%
Battery of motor physical tests	10	58.8
Triathlon simulations	9	52.9
Competition performance	7	41.2
Progression in training	7	41.2
Subjective evaluation of potential by the coach	6	35.3
Tests of specific skills	4	23.5
Anthropometric measurements	3	17.6
Evaluation of biological maturation	3	17.6
Psychological questionnaires	1	5.9
Social level and family conditions	1	5.9

Table 3. Importance attributed by Brazilian coaches to factors and indicators of sporting potential for the development of young talented triathletes (n = 37).

	Average ± DP	Importance Attributed (%)				
		Nothing	Not Much	Important	Very Much	Extremely
Anthropometric	3.3±0.9	2.7%	13.5%	40.5%	35.1%	8.1%
Body Mass	3.4±1.0	2.7%	10.8%	51.4%	16.2%	18.9%
Height	2.8±0.8	2.7%	37.8%	35.1%	41.5%	0.0%
Muscle Mass	3.2±0.9	2.7%	16.2%	40.5%	35.1%	5.4%
Wingspan	3.2±1.1	8.1%	16.2%	37.8%	27.0%	10.8%
Length of MMII	3.0±1.0	5.4%	27.0%	40.5%	18.9%	8.1%
Biotype	3.8±1.0	2.7%	8.1%	27.0%	35.1%	27.0%
Physical-motor	4.2±0.8	0.0%	2.7%	10.8%	45.9%	40.5%
Speed	3.9±0.9	0.0%	5.4%	29.7%	35.1%	29.7%
Isometric maximal strength of upper limbs	2.7±0.7	0.0%	45.9%	37.8%	16.2%	0.0%
Isometric maximal strength of lower limbs	3.1±0.9	1.1%	32.4%	32.4%	29.7%	5.4%
Lumbar traction force	3.2±1.0	2.7%	24.3%	35.1%	29.7%	8.1%
Dynamic maximal strength of upper limbs	3.3±0.9	0.0%	16.2%	48.6%	24.3%	10.8%
Dynamic maximal strength of lower limbs	3.7±0.9	0.0%	8.1%	37.8%	35.1%	18.9%
Potency of upper limbs	3.7±1.0	0.0%	10.8%	35.1%	29.7%	24.3%
Potency of lower limbs	4.2±0.9	0.0%	2.7%	21.6%	32.4%	43.2%
Aerobic endurance	4.5±0.7	0.0%	2.7%	5.4%	27.0%	64.9%
Flexibility	3.6±0.9	0.0%	10.8%	32.4%	43.2%	13.5%
Anaerobic endurance	4.0±0.9	0.0%	8.1%	16.2%	40.5%	35.1%
Agility	3.5±0.8	0.0%	8.1%	43.2%	37.8%	10.8%
Balance	3.7±0.8	0.0%	10.8%	27.0%	43.2%	18.9%
Reaction Time	3.3±1.1	2.7%	21.6%	32.4%	29.7%	13.5%
Motor Coordination	4.0±0.9	0.0%	2.7%	35.1%	24.3%	37.8%

Table 3. Continued...

	Average \pm DP	Importance Attributed (%)				
		Nothing	Not Much	Important	Very Much	Extremely
Technical	4.1 \pm 0.8	0.0%	2.7%	21.6%	40.5%	35.1%
Swimming specific skills	4.5 \pm 0.8	0.0%	2.7%	8.1%	27.0%	62.2%
Running specific skills	4.1 \pm 0.9	0.0%	5.4%	18.9%	35.1%	40.5%
Cycling specific skills	4.1 \pm 0.9	0.0%	5.4%	18.9%	37.8%	37.8%
Procedures within the transition area	3.8 \pm 1.1	0.0%	10.8%	32.4%	18.9%	37.8%
Hydrodynamics and aerodynamics	4.1 \pm 0.9	0.0%	2.7%	27.0%	32.4%	37.8%
Cyclic gesture of swimming, cycling, and running	4.4 \pm 0.8	0.0%	5.4%	5.4%	32.4%	56.8%
Tactical	3.2 \pm 1.0	2.7%	18.9%	43.2%	24.3%	10.8%
Positioning with respect to other competitors	3.6 \pm 0.9	0.0%	8.1%	43.2%	27.0%	21.6%
Vacuum utilization	4.2 \pm 0.8	0.0%	2.7%	18.9%	37.8%	40.5%
Pacing strategy	3.8 \pm 1.0	0.0%	10.8%	27.0%	37.8%	24.3%
Knowledge about the other triathletes	3.2 \pm 0.9	0.0%	24.3%	37.8%	32.4%	5.4%
Decision making in changing situations	4.0 \pm 0.9	0.0%	5.4%	27.0%	29.7%	37.8%
Approach actions to the opponent	3.6 \pm 1.0	0.0%	10.8%	37.8%	29.7%	21.6%
Supplementation strategy	3.8 \pm 1.1	2.7%	5.4%	37.8%	16.2%	37.8%
Psychological	4.3 \pm 0.6	0.0%	0.0%	8.1%	56.8%	35.1%
Self-confidence	4.4 \pm 0.8	0.0%	0.0%	16.2%	32.4%	51.4%
Ability to withstand pressure	4.5 \pm 0.7	0.0%	0.0%	10.8%	29.7%	59.5%
Concentration	4.5 \pm 0.6	0.0%	0.0%	8.1%	37.8%	54.1%
Competitiveness	4.2 \pm 0.8	0.0%	2.7%	18.9%	35.1%	43.2%
Goal setting	4.0 \pm 0.8	0.0%	2.7%	27.0%	40.5%	29.7%
Dealing with adversity	4.5 \pm 0.6	0.0%	0.0%	8.1%	37.8%	54.1%
Trainability	4.4 \pm 0.7	0.0%	0.0%	10.8%	43.2%	45.9%
Determination	4.6 \pm 0.6	0.0%	0.0%	8.1%	21.6%	70.3%
Environmental	3.6 \pm 1.0	0.0%	13.5%	40.5%	18.9%	27.0%
Having an athlete in the family	2.3 \pm 1.1	24.3%	40.5%	24.3%	5.4%	5.4%
Early initiation	3.3 \pm 1.2	8.1%	16.2%	40.5%	10.8%	24.3%
Socioeconomic level	2.9 \pm 0.9	8.1%	18.9%	51.4%	18.9%	2.7%
Sports practice of parents	2.8 \pm 1.0	13.5%	18.9%	48.6%	13.5%	5.4%
Training location/club	3.6 \pm 1.0	2.7%	8.1%	40.5%	27.0%	21.6%
Academic performance	3.2 \pm 1.0	2.7%	16.2%	48.6%	18.9%	13.5%
Physical activity level	3.9 \pm 1.0	2.7%	2.7%	24.3%	40.5%	29.7%
Family support	4.3 \pm 0.8	0.0%	2.7%	13.5%	32.4%	51.4%
Quantity of practice	4.0 \pm 0.9	0.0%	5.4%	24.3%	37.8%	32.4%
Quality of practice	4.2 \pm 0.9	0.0%	8.1%	10.8%	32.4%	48.6%
Competition experience	3.5 \pm 1.1	5.4%	10.8%	27.0%	37.8%	18.9%

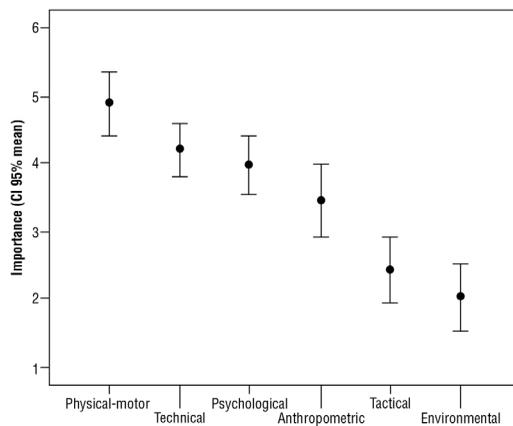


Figure 1. Order of importance assigned by coaches to factors of sporting potential relevant to the development of young triathletes (n = 37).

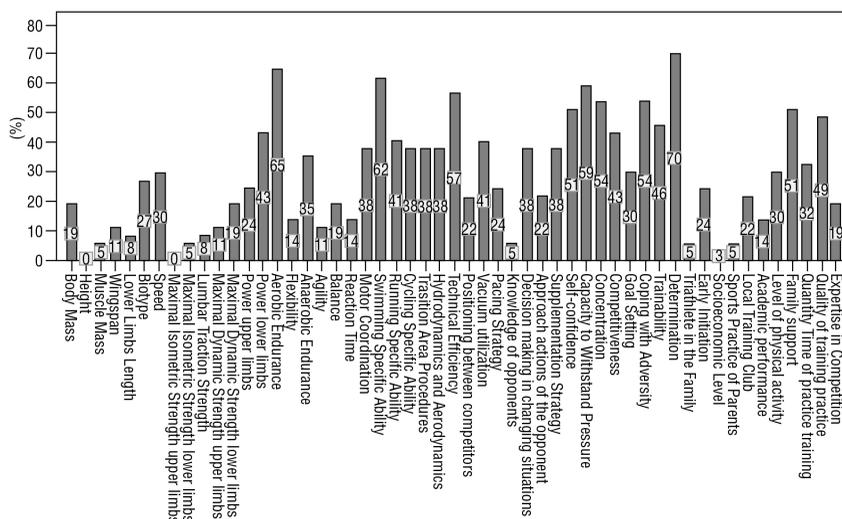


Figure 2. Proportion of coaches who considered as "extremely important" the indicators of sporting potential for the development of young talented triathletes (n=37).

DISCUSSION

Traditionally, the process of identifying talent for the triathlon involves physical-motor tests and performance in competition^{15,22}. Following this trend, in this study, 58.8% of the coaches who perform some process to identify talents use a battery of physical-motor tests and 41.2% use performance in competition. Most of the time, the talent identification process is done by observing the progression of the young athlete in training and his or her performance in competition, besides the use of specific skills tests. It is known that talent is identifiable and that there is no gold standard for this. The consensus is to use a multidisciplinary and longitudinal approach^{1,3}. In practice, talent identification models should combine objective and subjective criteria analyzed by statistical modeling and systematically throughout the long-term training process¹³.

On the other hand, more than half of the Brazilian triathlon coaches (54.1%) do not identify talents. This finding can be understood through the assertion of Ribeiro et al.¹⁸ where they indicate that the coaches rely on their experiential knowledge, on the visualization of the athlete in his context and thus know how to make decisions about the detection or identification of sporting talent.

Thus, it is speculated that a large part of Brazilian triathlon coaches uses only subjective perception to identify talent in triathlon.

Regarding the importance assigned by coaches to sporting potential factors, the greater importance assigned to the physical-motor factor corroborates the most recent studies on the subject^{8,15,23}. These findings confirm the endurance characteristic of the triathlon, which does not require complex technical gestures and where tactics are not as important as in other sports, but rather a greater contribution of physical-motor aspects^{7,8,11,24}.

In the sequence of importance degree, the technical (4.21±1.20), psychological (3.97±1.28), and anthropometric (3.46±1.61) factors appear. Cuba-Dorado and García-García²³ and Bottoni et al.¹⁵ found similar degree of importance for the technical factor. This importance may be justified by the fact that a good technique achieves articular angles that provide the greatest possible strength or power, which proves to be very important in a sport of cyclic gesture eminently; facilitates progression by decreasing aerodynamic and hydrodynamic resistance, a very important aspect in outdoor speed sports; and to help in accelerations, decelerations, climbs, descents, curves, buoy turns, entry and exit in open water, among other demands that are inherent characteristics of the triathlon with a free vacuum, where a deficient technique can make good placements at the end of the race unfeasible²⁴⁻²⁶.

Although the research of Kovářová and Kovář⁸ showed low correlation of psychological aspects as a performance factor for a potential talent in triathlon, Bottoni et al.¹⁵ and Zemanová and Kovář²⁵ found similar results to ours indicating that the psychological factor does play a relevant role in the development of young triathletes. Regarding the anthropometric factor, the current consensus is that this factor has an important weight as a performance factor in the triathlon^{6,12}, but it should not be exclusive, especially in the case of young people who achieve good values in other factors that determine performance^{9,10}.

In the present study, the coaches attributed a lower order of importance to the tactical (2.43±1.38) and environmental (2.03±1.50) factors. Despite this, their degree of importance was 3.22±0.98 and 3.6±1.04, respectively, that is, an average number between important and very important for the development of young triathletes. About the environmental factor, some theories propose approaches for ideal talent development considering the social environment as a key element that interacts with the physical factors, even highlighting the importance of this environment as a catalyst in talent development²¹. Furthermore, Kovářová and Kovář⁸ and Bottoni et al.¹⁵ state that these factors may not be as relevant as athletic predispositions, but should be taken into consideration for the proper development of the triathlete, as well as the importance given at each stage of development.

Regarding the tactical factor, Cejuela et al.²⁴ indicates that tactics is a decisive factor in the triathlon with high performance released vacuum. However, Cuba-Dorado and García-García⁹ indicates that this factor can be worked on during the development of the young triathlete, although they also consider it an important factor. Thus, our findings are similar, since the coaches offered a degree of importance between important and very important, but placed this factor last in order of importance along with the environmental factor.

In relation to the indicators, what was considered most important by the coaches as “extremely important” was determination (70%), followed by aerobic endurance (65%). The result found regarding aerobic fitness corroborates several triathlon researchers, considering the characteristics of the Olympic triathlon, where athletes perform the event with times close to 2 hours^{7,10,23,24}.

In regards to determination, it is a psychological characteristic necessary for athletes to withstand the demands of a typically physical performance sport. This result corroborates the study by Bottoni et al.¹⁵ who also surveyed the opinion of coaches and triathlon experts who pointed motivation and mental strength as the most important indicators. This can be explained by the fact that the Olympic triathlon demands a high training volume, usually even higher than that of marathon runners, and that it usually presents a long race execution time.

The limitations of this study include: non-random sample of coaches and few female coaches. Furthermore, the application of the questionnaire at a distance, without the presence of the researcher, makes it difficult to ask any doubts about the questionings, which may harm the answers of the participants. Finally, maturational and genetic aspects that may be involved in the process of evaluating the potential of the athletes were not considered. These aspects should be investigated in future studies.

The judgment of the coaches is the solution usually adopted for detection and identification of sporting talent. It is believed that the “coach’s eye” and the judgment of the expert are decisive in screening and selecting athletes²⁷. However, this judgment is a subjective process that leads to differences regarding the criteria adopted for athlete identification and selection²⁸. Coaches have expertise in identifying talented young athletes and their accuracy in predicting future success can be as high as 80%²⁹. An understanding of coach opinion is important, as coaches have an important, though often underutilized, role in the research and practice of talent detection²¹. For the young triathlete, the coach is of vital importance because of his influence on motivation, optimal athlete development, the importance of his instructions, and his relationship with the young athlete¹¹.

The profile understanding of the triathlon athletes, based on the questionnaire applied to the coaches, will be able to serve as a tool for the identification of potentially talented athletes, in which the evaluation and prediction of the capacities of these athletes will be able to be integrated with the opinion of the coaches for the reduction of errors in the selection and development. With the results of this study, coaches can have a reference of which indicators to work on in a specific way in order to achieve training objectives, as well as a reference for the elaboration of test batteries and/or selection processes for triathlon athletes. Talent selection is a dynamic process that is constantly evolving, and new studies are required on factors and indicators that determine elite category performance, aiming at formulating an evaluation with the fewest possible errors for correct guidance and maximum performance of the young athlete^{15,30}.

CONCLUSION

Based on the analysis of the opinion from the Brazilian triathlon coaches, talent identification is done mainly through a battery of tests and triathlon simulations. This study also concluded that the physical-motor factor was the most important for the development of young talented triathletes, but not the only one. Most coaches considered as extremely important the following indicators: determination, aerobic endurance, specific swimming skills, ability to withstand pressure, and cyclic gesture of swimming, cycling, and running.

This result suggests that the identification and development of talent in triathlon should adopt a multidisciplinary approach, using objective and subjective indicators, combining scientific knowledge and the experience of coaches throughout the long-term training process.

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COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

Ethical approval was obtained from the local Human Research Ethics Committee from the Federal University of Ouro Preto, and the protocol (no. 817.671) was written following the standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interest to declare.

Author Contributions

The conception and design of the experiment: LAV, FZW, EFC, JRPL; Performance of the experiments: LAV, FZW, LM; Analysis of the data: FZW; Contribution of research materials/analysis tools: LAV, FZW, EFC, LM, JRPL; Writing of the article: LAV, FZW; All authors read and approved the final version of the manuscript.

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