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Original Article

La estructuración de una prueba de selección para los talentos en el deporte

Structuring a selection test for talents in sport

A estruturação de um teste de seleção para talentos no esporte

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ABSTRACT

The detection of a possible sports talent constitutes one of the fundamental premises of any sports system. This work aimed at establishing normative parameters for sports selection according to the characteristics of the population and with easily accessible measuring instruments, which allows the best sports prospects to be selected at the beginning of each season. The methods applied are the historical-logical, analytical synthetic, inductive-deductive, documentary analysis were used as the main research methods and techniques. A survey was applied to 135 coaches to determine the test and statisticians. This research establishes a proposal for a sports selection test based on the study of an age group of 1729 boys and girls from 9 to 12 years old, which final result is the structuring of a selection test with its respective evaluation scale, based on studies by leading authors, which allows the standard for children to enter sports



initiation schools in an ideal way. In this study there are several alternatives to identify aspects to consider in a control test for the evaluation and selection of sports talents, in addition to a critical analysis and after applying the selected techniques and instruments, this test is feasible, based on the results achieved.

Keywords: Selection test; Sports talents.

RESUMEN

La detección de un posible talento deportivo constituye una de las premisas fundamentales de cualquier sistema deportivo. El objetivo de este trabajo es establecer parámetros normativos de selección deportiva acordes a las características de la población y con instrumentos de medición de fácil acceso, lo que permite, al inicio de cada temporada, seleccionar los mejores prospectos deportivos. Se emplearon como principales métodos y técnicas de investigación el histórico-lógico, analítico-sintético, inductivo-deductivo y análisis documental. Se aplicó una encuesta a 135 entrenadores para la determinación de la prueba y estadígrafos. Esta investigación establece una propuesta de una prueba de selección deportiva en base al estudio de un grupo etario de 1729 niños y niñas de 9 a 12 años, cuyo resultado final es la estructuración de una prueba de selección con su respectiva escala de evaluación, basado en estudios de principales autores, lo que permite instaurar de manera idónea la norma de ingreso de los niños a las escuelas de iniciación deportiva. En este estudio, existen varias alternativas para identificar aspectos a considerar en una prueba de control para la evaluación y selección de talentos deportivos, además, en un análisis crítico y luego de aplicar las técnicas e instrumentos seleccionados, esta prueba es factible, basada en los resultados alcanzados.

Palabras clave: Prueba de selección; Talentos deportivos.

RESUMO

A detecção de potenciais talentos esportivos é uma das premissas fundamentais de qualquer sistema esportivo. O objetivo deste trabalho é estabelecer parâmetros normativos para a seleção esportiva de acordo com as características da população e com instrumentos de medição de fácil acesso, o que permite, no início de cada temporada, selecionar as melhores perspectivas esportivas. Os principais métodos e técnicas de pesquisa utilizados foram a análise histórico-lógica, analítico-sintética, indutiva-dedutiva e documental. Uma pesquisa foi aplicada a 135 técnicos para determinar o teste e as estatísticas. Esta pesquisa estabelece uma proposta de teste de seleção esportiva baseada no estudo de uma faixa etária de 1729 meninos e meninas de 9 a 12 anos de idade, cujo resultado final é a estruturação de um teste de seleção com sua respectiva escala de avaliação, baseada em estudos dos principais autores, o que permite estabelecer um padrão adequado para a admissão de crianças em escolas de iniciação esportiva. Neste estudo, há várias alternativas para identificar aspectos a serem considerados em um teste de controle para a avaliação e seleção de talentos esportivos, além disso, em uma análise crítica e após a aplicação das técnicas e instrumentos selecionados, este teste é viável, com base nos resultados alcançados.

Palavras-chave: Teste de seleção; Talentos esportivos.



INTRODUCTION

The selection of talents nowadays has had more opinions in favor than against it. Until the end of the 20th century, most authors have agreed that it was the Eastern European countries that were the most successful in the use of predictive procedures for the performance of athletes. Already in the present, sport activity, in general, acquires greater relevance. This is reflected in its didactic treatment, at first because of the social recognition and then because of the amount of resources that a good result can generate, especially in top level sport, there are several authors who have addressed this issue.

The methods used in sports selection in the modeling of the best athletes at the level of the Olympic cycle, undoubtedly, since the last century, have been studied by authors such as Volkov and Film (1989), Balandin and Plajtienko (1986), Platanov (2011); the first three authors propose a set of essential aspects, in which a complex of subsystems indispensable for the achievement of the result is included. In such a chart, it is common to find represented a relationship of horizontal components and also a series of vertical hierarchies of relationship (Figure 1).

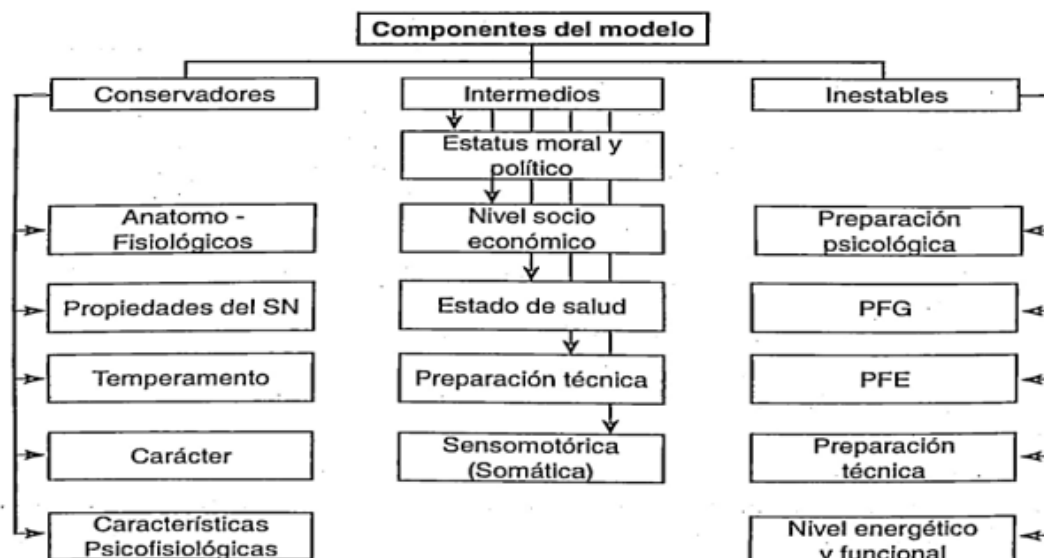


Fig. 1.- Characteristic components of the model
Source: (Balandin V. Bludob and Plajtienko V. 1986) cited by Leiva (2010).

In the last decade, there were several studies regarding the parameters for the selection of sports talent, one of them is followed by Leiva (2010) who, based on studies by Nikitiuk. B. (1991), Abramova et al., (2003) and Nazatov I. (2000), states that dermatoglyphia is a method used for sports selection since the twentieth century, in order to distinguish and predict the phenotype early, from the results of the genotype as one of the essential aspects for the overall improvement of the quality of life of people; method little used and applied for sports selection. Dermatoglyphics is the study of the fingerprint impressions of the distal phalanges, which are perennial, immutable and infinitely diverse. There are studies of dermatoglyphics such as Fernandez Filho who compared the fingerprint designs of 33 players of the national basketball team of Russia and Brazil, as well as players of teams of the Russian national league of this sport and accumulated a total of 167 players. In the result of this study, it is revealed that Russian



and Brazilian players, as they increase the level of sports qualification, the values of D10, SCTL, also increases the number of Whorls (W), but decreases the number of Arches (A) (Table 1).

Table 1. - Fingerprint designs of basketball players of the Russian and Brazilian national teams

Índices	GRUPOS							
	Selección de Rusia n=33		Selección de Brasil n=35		Primera División n=112		Jugadores de bajo nivel n=20	
	X	δ	X	Δ	X	δ	X	δ
D10	14.10	3.06	13.60	3.35	12.93	3.63	12.20	1.59 +
SCTL	142.22	32.80	136.71	40.36 -	122.45	40.90	111.85	37.35 +
A	-	-	0.20	0.47	0.49	1.37 x	1.05	1.43 +
L	5.42	3.07	6.00	3.03	6.07	2.83	5.70	2.27
W	4.58	3.07	3.80	3.16	3.43	2.95	3.25	2.73

Source: Leiva (2010).

In relation to today's sport, which involves demands of extreme training and preparation processes, which often exceed the functional possibilities, it is necessary to identify the right athletes who can withstand these high demands of preparation and competitions for several years. As Leiva states, dermatoglyphia is one of the methods that could be applied in South America in the future, while he assures that sports quantification can be done through the state of the body complexion, psychological state and physical qualities; to this, it can be added the size projection, also called prediction or projection, so there are ideal somatotypes for each sport discipline.

The process to achieve the selection of sports talent is complex and requires the implementation of strategies, specifically conceived in the stages corresponding to the different levels of sports specialization, where the selection constitutes the process prior to the preparation of each of these stages (Romero, 2005); (Castañeda *et al.*, 2007); (Martin D, Nicolaus J, Ostrowski, Rost K. 2007); (Romero *et al.*, 2014); (Aldas and Gutierrez, 2015); (Vinueza, 2017). For this, the study conducted by Romero (2005) Romero *et al.*, (2014) is assumed as a starting point.

The importance of its application lies in:

1. In the knowledge that is achieved of the degree of correspondence between the aspirations of the athletes and/or coaches and the real possibilities of achieving them.
2. In understanding the characteristics of the subjects themselves who will receive the training loads.
3. In the degree of general maturation of the pupil, depending on the logic of the stage in which he/she has to develop.



Several authors, among them **Romero & Takahashi (2004)** referring to sport selection, express that it responds to the following basic indicators:

- Exercise results that have a high correlation with competitive testing.
- Paces of development of dominant motor capacities.
- Pace of development of competitive results.
- Rate of assimilation of the training load.
- Genetic inheritance
- The intuition of the coach or trainer.

In general, the authors conducted a literature search on talent selection in sports and were able to verify that there are limitations in terms of normative parameters for sports selection according to the characteristics of the population and with easily accessible measurement instruments (**Garzón, 2017; Madrigal & Córdova, 2017; Rodríguez, 2017; García & Madrigal, 2018; González & Velázquez, 2018; Sánchez et al., 2020; Córdova, et al, 2020; Navas & Navarro, 2021**).

In correlation to these technical criteria, in Ecuador, a study was carried out to establish the normative parameters of sports selection according to the characteristics of the population and with easily accessible measuring instruments, which allows, at the beginning of each season, to select the best sports prospects.

This analysis leads to the following objective: to establish normative parameters for sports selection according to the characteristics of the population and with easily accessible measuring instruments, which allows, at the beginning of each season, to select the best sports prospects.

MATERIALS AND METHODS

Population and selection of the study group

This study was conducted in the first quarter of 2013, with a population of 1729 boys and girls of the main sports of 19 provinces of the Coast, Highlands and Amazon of the Republic of Ecuador. Once the information was tabulated, it was possible to extract a stratified intentional sample of 1234 children aged 9 to 12 years, which is the result of this work (Figure 2).



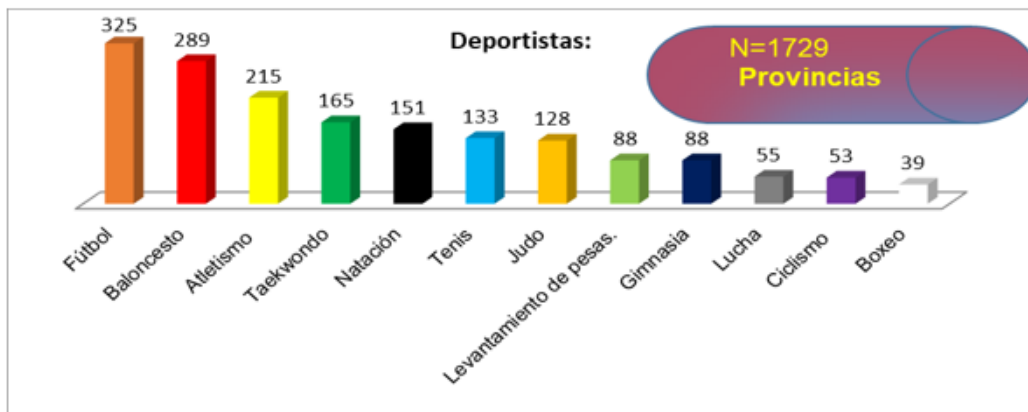


Fig. 2. - Population for the elaboration of the Sport Selection test

Research instruments

The main methods used are historical-logical, analytical-synthetic, inductive-deductive, documentary analysis and descriptive statistics.

In addition, three measurement instruments are used for the development of the research:

1. Determination of the selection test by means of a survey of coaches.
2. Study of growth trends in children's physical abilities.
3. Determination of percentiles for measurement.

Instrument #1

A general test is elaborated based on a survey to a population of 135 coaches of different sports, with the purpose of establishing the anthropometric and physical parameters by age, in relation to the quality of the exercises that should conform the measurement instrument (Figure 3).

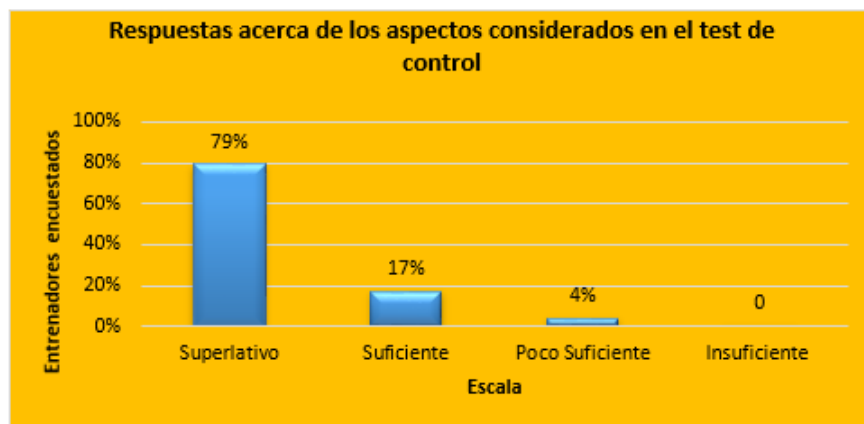


Fig. 3 - Response of the coaches to the tests to be inserted



The results reflect that, of the coaches surveyed, 96 %, that is, 131 affirm that the aspects considered in the control test are superlative and sufficient (pertinent); on the other hand, only 4 %, which corresponds to 6 respondents, state that the aspects considered in this test are not enough. This allows us to conceive that most of the coaches agree with the aspects considered in this control test.

Instrument #2

For the conformation of the physical control tests, the study of the growth tendencies of the physical capacities obtained with a group of 200 boys and girls between 9 and 11 years of age is assumed. Table 2 shows the tendency of continuous evolution of motor capacities (Cornejo & Mantenga, 2003) (Table 2).

Table 2. - Trend of growth of physical preparation from one age to another in children from 9 to 11 years old

Testing	Female			Male		
	9 years old	10 years old	11 years old	9 years old	10 years old	11 years old
40m run	9,204 ± 3.3	8,893± 3.9	8,109± 1.0	8,524± 3.2	7,933± 3.4	7,594± 1.3
Long Jump without running	121,2 ± 31	132± 21	136,9± 20	131,4± 21	139,6± 29	146± 22
Baseball throwing	13,72 ± 4.7	17,97± 5.9	19,81± 7.9	16,5± 5.5	19,08± 5.5	20,45± 5.0
400 m run	126,7± 41	124,8 ± 46	119,4 ± 22	110,3 ± 31	104,9 ± 33	96,58 ± 13

Instrument #3

To establish a preliminary mass regulation, in the anthropometric indicators in the research, the percentile values shown in Table 3 were considered; the value that each of them has in sport and to detect the population in the ages investigated and that meet those parameters (Romero & Pupo, 2007) and Vinueza (2016) were considered (Table 3).

Table 3. - Percentiles for talent selection

Percentile	Evaluation
50-70	Regular
71-80	Good
81-90	Very Good
Over 90	Excellent



Statistical techniques used

The following indicators are used for statistical processing of the results:

- Mean (X), deviation (S) and coefficient of variation (CV) and the percentile technique, with which the intervals of the norms by age were established.
- With the values of the Coefficient of Variation, it was possible to characterize the degree of group dispersion.
- The corresponding intervals were also established to provide feedback for the follow-up of the students for the first and second year of the selection, according to the percentile values 80-90 and above 90, which corresponds to levels III and IV.

RESULTS AND DISCUSSION

The results obtained in this study were analyzed according to the measurement instruments established by the technical team of the National Sports Federation of Ecuador, issued in 2013, methodology that was published by *Romero et al., (2014)*.

The results of the research are:

1. Composition of the control tests.
2. Composition of the output tables.
3. Rules for the selection of potential talented children by sport.

Composition of the control test

According to the studied parameters, the control test is conformed as follows:

1. Size.
2. Weight.
3. Cormic index: 100 (sitting size/standing size), where both sizes are measured in centimeters.
4. Stroke or wingspan, in centimeters.
5. Thirty meters thrown with 10 m. of impulse, in seconds.
6. Long jump without an impulse run in centimeters.
7. Crunches in 30 seconds, in repetitions.
8. 30-second prone elbow bends in 30 seconds, in repetitions.
9. Run (600 m.), in minutes, seconds.



Composition of the output tables

The control test applied for the evaluation of the level of each of the most relevant motor skills for the sport has a value of 50 points, establishing a total of 10 points per indicator and to pass it the applicant must obtain at least 50-70 % of them, equivalent to a minimum of 25-35 points.

For the qualitative evaluation of the control test, the following standards are established:

- 50-70 percentile: Regular.
- 71-80 percentile: Good.
- 81-90 percentile: Very Good.
- Greater than 90th Percentile: Excellent.

For the evaluation of the state of physical preparation, four levels were determined, each one of them being indicative of possible talent in physical preparation, according to the most relevant motor capacity (Hernández, 2000).

For this purpose, it was agreed that Level I is the lowest and Level IV is the highest, based on the following criteria:

- Level I: 10-20 points.
- Level II: 21-35 points.
- Level III: 36-40 points.
- Level IV: 41-50 points.

According to this scale, the most suitable athletes to start the practice of sport with medium and high initial qualities are levels III and IV, but this indicator is not absolute, so more parameters can be considered for talent selection, including measurements of height and weight, dermatoglyphia studied in South America by Leiva (2010); in the same line, agree Ranzola (2004); Platanov (2011); Romero & Becali (2014) and Duran, Aldas, Avila, & Heredia (2020) when they propose alternatives such as the assessment of morphological aptitudes, functional qualities, biological maturation, psychological qualities, genetics and/or the creation of a sports talent selection system and its orientation.

In the following values, criteria of De la Paz, (2004) and Romero *et al.*, (2014) are considered and the percentiles used to characterize the anthropometric results related to the length of the levers and height can be observed, which respond to figures associated with the requirements of contemporary sport, where they, in general, become substantial indicators with sports performance and considered for this study (Table 4)



Table 4. - Percentiles (P) used in the anthropometric values evaluated

Weight	Size	IC	Stroke
50-70 P	70-90 P	50-90 P	50-90 P

Source: Romero *et al.*, (2014).

In table 4, the exposed data are revealed, the percentile values are reflected already transferred to the measurements by ranges that will allow technicians to make the preliminary selection of potential talents; this reference is valid, when assessing the general anthropometric aptitudes, it will allow to have a normative indicator that allows you to make a proper selection, for which you need a scale and a tape measure (Forteza, 2005) (Romero *et al.*, 2014).

Table 5. - Anthropometric indicators assessed

Weight Kg	Size Cm	IC %	Stroke cm	Weight Kg	Size IC cm	%	Stroke cm
9-10 female				9-10 male			
32-37	137-139	51.4-50.3	136-138	138-139	51,0-49.5	138-140	137-139
11-12 female				11-12 male			
41-46	150-151	49.3-47.2	151-152	147-149	49.4-48.9	145-148	150-151

Edited from: (Romero *et al.*, 2014)

Table 5 establishes the normative parameters that the talents must meet to start the sport practice, considering it as an important reference for the coach at the moment of the sport selection (Table 5).

Table 6. - Standards for general screening 9-10 years old female

Evaluation	Total points	30 m thrown (seg)	Long jump s/c de impulse (cm)	Crunches. 30 seg, (Rep.)	Elbow bends 30 seg, (Rep.)	Run 600 m Min)
Level I	1	6.89-5.76	100-120	6-8	5-6	4.27-4.09
	2	5.75-5.41	121-125	8-9	7-8	4.08-3.17
	3	5.40-5.26	126-135	10-11	9	3.16-3.00
	4	5.25-5.02	136-142	12-14	10	2.59-2.46
Level II	5	5.01-4.74	143-147	15	11-13	2.45-2.40
	6	4.73-4.52	148-151	16	14	2.39-2.38
	7	4.51-4.38	152-156	17-18	15-16	2.37-2.30
Level III	8	4.37- 4.24	157-181	19	17	2.29-2.19
Level IV	10	4.24-4.13	182-190	20	18-22	2.18-2.09



Table 7. - General screening norms 9-10 years old male

Evaluation	Total points	30 m thrown (seg)	Long jump s/c de impulse (cm)	Crunches. 30 seg, (Rep.)	Elbow bends 30 seg, (Rep.)	Run 600 m (Min)
Level I	1	5,57-5,47	125-133	12-13	6-7	4.15-3.19
	2	5,46-5,11	133.1-140	14-15	8-9	3.18,9-3.03
	3	5,10-5.04	140.1-142	16	10-11	3.02.59-3.00
	4	5,03-4,95	142.1-150	17	12-13	2.59,9-2.54
Level II	5	4,94-4,72	150.1-157	18	14-15	2.53.9-2.47
	6	4,71-4,50	157.1-160	19-20	16-18	2.46.9-2.41
	7	4,49-4,37	160.1-174	21	18-19	2.40.9-2.37
Level III	8	4,36-4,02	174.1-190	21-22	20-22	2.36.9-2.18
Level IV	10	4,01-3.54	190-195	23-24	23-24	2.18-2.14

Table 6 and 7 reflect the parameters, there is a marked difference in relation to girls; therefore, the coach should pay attention to this aspect that, empirically, it was considered that there was no major difference between the two sexes (Tabla 7).

Table 8. - General screening standards 11-12 years old female

Evaluation	Total points	30 m thrown (seg)	Long jump s/c de impulse (cm)	Crunches. 30 seg, (Rep.)	Elbow bends 30 seg, (Rep.)	Run 1000 m (Min)
Nivel I	1	5,87-5.31	128-131	11-12	9-10	5.45-5.06
	2	5,30-4.99	131.1-143	13-14	11-12	5.05-4.59
	3	4,98-4.82	143.1-155	15-16	13	4.58-4.41
	4	4,81-4.66	155.1-161	17	14	4.40-4.18
Nivel II	5	4,65-4.57	161.1-168	18	15-18	4.17-4.11
	6	4,56-4.48	168.1-176	19-20	19-20	4.10-4.06
	7	4,47-4.30	176.1-185	21	21-23	4.05-4.00
Nivel III	8	4,29-4.00	185.1-191	22	24-25	3.59-3.51
Nivel IV	10	4,00-3,73	191-200	23-24	26	3.51-3.46

Table 9. - General screening standards 11-12 years old male

Evaluation	Total point	30 m thrown (seg)	Long jump s/c de impulse (cm)	Crunches. 30 seg, (Rep.)	Elbow bends 30 seg, (Rep.)	Run 600 m (Min)
Nivel I	1	5,33-5,00	135-144	14	10-11	5.42,07-5.26,20
	2	4.99-4,70	144.1-151	15-16	12-13	5.26,19-5.48,70
	3	4,69-4,62	151.1-158	17	14-15	4.48,69-4.30,20
	4	4,61-4.51	158.1-170	18-19	16	4.30,19-4.20,00



Nivel II	5	4,50-4.41	170.1-180	20	17-17	4.19,59-4.13,79
	6	4,40-4,29	180.1-181	21	19	4.13,78-4.09,10
	7	4,28-4.02	182.1-190	22	20	4.09-09-4.01,60
Nivel III	8	4,01-3.56	190.1-200	23-24	21-24	4.01,59-3.15,31
Nivel IV	10	3,56-3.08	200-204	25-26	25-26	3.15-3.10

In Table 8 and 9, the criteria for the detection of talents for late specialization sports, such as Weightlifting, Boxing, Wrestling and others, are established, which admits an adequate recruitment for this type of sport (Table 8) y (Table 9).

In summary, the standards for the detection of potential talents are the first step in the selection, as they allow determining the initial level of physical preparation and anthropometric data that a child has and its projection; the main educational centers are a strategic ally for Physical Education teachers and coaches of sports initiation that, by applying them, can evaluate and detect sports talents to project them to sports initiation (Vinueza, 2016).

Standards for the selection of potential talented children by sports

When applying the control test by sport, the anthropometric standards are references for the selectors, although they are not assigned a score because of the variability that may be present at the time of sexual development of each child-adolescent. (Ranzola, 2004). It is important to determine the indicators that demonstrate the quality of talent as reflected in Table 10, which allows for proper sports selection (Table 10).

Table 10. - Evaluation scale for the detection of possible talents in sport

Talent Quality	Scoring	Evaluation
Potential Very High Starting Talent	46 - 50 points	Excellent
Potential High Starting Talent	41-45 points.	Very Good
Possible talent of Medium starting qualities	36-40 points	Good
	25-35 points.	Regular
Applicant with few starting qualities		
Disapproved	Less than points.	25 Bad

Table 10 reveals that the applicants with evaluations of Excellent and Very Good reflect great potential for the practice of the sport, but without discarding the inclusion of those evaluated as Good, who in the end may turn out to be great talents depending on the variants and exceptions that occur in the sport, which may be the result of a delayed sexual development, but who in the end turn out to be potential talents.

CONCLUSIONS

In conclusion, the study reveals that there are several alternatives to identify aspects to consider in a control test to evaluate and select sports talents. Moreover, in a critical



analysis and after applying the selected techniques and instruments, this control test can be proposed, based on the results achieved.

The authors of this work are aware that the results obtained will solve in part the problems that may arise in the selection of sports talent in different disciplines, but in itself will contribute positively in the process of sports selection.

The standards extracted from the research on 1234 girls and boys aged 9 to 12 years set the basis for the selection process in various sports that, over time, can be improved and refined, suggesting to all interested parties to offer their indications and recommendations for improvement.

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The authors declare not to have any interest conflicts.

Authors' contribution:

Edwim Olimpo Vinueza Tapia: Conception of the idea, literature search and review, instrument making, instrument application, compilation of information resulting from the instruments applied, statistic análisis, preparation of tables, graphs, and images, database preparation, general advice on the topic addressed, review and final version of the article, article correction, authorship coordinator.

Helder Guillermo Aldas Arcos: Conception of the idea, literature search and review, statistic análisis, preparation of tables, graphs, and images, database preparation, drafting of the original (first version), review and final version of the article, article correction, authorship coordinator, translation of terms or information obtained, review of the application of the applied bibliographic standard.



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