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Comprehensive assessment of the potential of young track and field athletes: modern methods and application possibilities at the stage of primary selection

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The article discusses modern methods for assessing the potential of young track and field athletes based on a comprehensive analysis of their physical fitness and motivation. Approaches to the use of such methods at the stage of primary sports selection are proposed, which allows for more accurate prediction of children's future successes and optimization of coaches' work. The results of the study contribute to the development of effective systems for the selection and development of young athletes.
Keywords: athletics, assessment of prospects, sports selection, motivation, physical qualification.

В статье рассматриваются современные методы оценки перспективности юных легкоатлетов, основанные на комплексном анализе их физической подготовленности и мотивации. Предложены подходы к использованию таких методов на этапе первичного спортивного отбора, что позволяет более точно прогнозировать будущие успехи детей и оптимизировать работу тренеров. Результаты исследования способствуют развитию эффективных систем отбора и развития молодых спортсменов.
Ключевые слова: легкая атлетика, оценка перспективности, спортивный отбор, мотивация, физическая подготовленность.

Introduction. The selection and orientation of athletes are key stages of training in any sport, especially in athletics, where success depends on a combination of physical, technical and psychological qualities. In the modern world, characterized by the rapid development of technology and the growing influence of virtual reality, the problem of attracting and retaining young athletes in sports sections is increasing. The research shows that modern children increasingly prefer digital entertainment, which negatively affects their physical activity and motivation for sports [1].

In connections with it is important to develop effective methods for primary selection of talented children, capable to become high-class athletes in future. In recent years, the issues of assessing the potential of young athletes for the purpose of selecting children for sports have been actively discussed in the scientific literature. So, V.P. Guba, A.V. Solodnikov [2] in their works emphasized the importance of complex ratings potential, including physical, psychological and technical parameters. Similar ideas are found in the research of Issurina [3], where offered models block periodization and ratings sports potential.

In developing athlete selection systems, special attention is paid to the creation of comprehensive indicators that make it possible for a high degree of reliability to predict a child’s future athletic achievements [4]. This article examines the experience of using such an indicator at the stage of primary selection of young track and field athletes, and also proposes its expanded concept taking into account modern scientific approaches.

Selection and orientation are key elements of training in any sport. In the modern world, coaches are increasingly faced with the problem of high-quality selection of children for sports sections. The rapidly developing world of virtual reality increasingly absorbs children, which hinders the correct and comprehensive development, formation of their motor culture and motivation for sports. As a means of increasing the effectiveness of the primary selection of children for athletics, the public association «Belarusian Athletics Federation» together with the Ministry of Education of the Republic of Belarus and the Ministry of Sports and Tourism of the Republic of Belarus in 2015 proposed the project «300 talents for the Queen» [4]. The main goal of the project is the selection and attraction of children to athletics. It is based on monitoring the level of general physical fitness of students of grades 2–4 of general secondary education institutions of the Republic of Belarus. The best of them are selected based on the results demonstrated in the performance of motor tests within the framework of the training program – 30 m run, standing long jump, 4 × 9 m shuttle run, ball throw, 800 m (500 m) run. In the final part of the project, the young athletes selected in this

way take part in face-to-face competitions in events close to specialization in individual track and field disciplines, using special lightweight sports equipment – hurdles, standing long jump, medicine ball throw, relay race. During the preparation for the final, all the participants take part in a training camp, where they work with track and field coaches and activate their procedural motives during physical exercises: students satisfy the need for physical activity, enjoy the process of the activity itself (the factor of competition, risk, excitement, the sweetness of victory, etc.), thereby increasing the level of motivation for sports [5].

The level of achievements in modern sports is so high that in order to surpass it, an athlete must have rare morphofunctional data, a unique combination of a complex of physical and mental inclinations and abilities that are at an extremely high level of development. Such a combination is very rare.

In theoretical terms, it is possible to identify factors that can be taken into account when developing an integral indicator of the prospects of a young athlete [6], [7]. They include:

1. Physical data and abilities of the athlete: it is important to take into account the physical fitness and anthropometric indicators of the athlete, such as height, weight, muscle mass, speed-strength indicators, etc.

2. Psychological characteristics: it is important to consider motivation, determination, perseverance, self-control, stress resistance and other personal qualities that can affect success in sports.

3. Technical skill: It is important to consider the technical execution of movements in the chosen athletics discipline, such as running, throwing, jumping and others.

4. Tactical skills: It is important to consider the ability to make strategic decisions during competitions, adapt to the situation and act in accordance with the tasks set.

5. Medical data: It is important to consider the overall health of the athlete, the presence of injuries and possible health risks associated with playing the sport.

The aim of the study was to develop and test an integrated indicator of the prospects of a young athlete, taking into account the level of their general physical fitness and motivation.

Research objectives:

1. To present diagnostic tools for determining the level of motivation of a young athlete at the initial selection stage.

2. To present a method for determining the weighted intra-group rank of a young athlete based on the results of general physical training competitions.

3. To develop an integrated indicator of a young athlete's potential, taking into account their level of general physical training and motivation.

4. Based on the results of the competition within the framework of the project «300 talents for the Queen», to determine the potential of each participant and make a forecast for the future.

Material and methods. In developing an integral indicator of the prospects of a young athlete at the initial selection stage, we tried to take into account only some of the above-mentioned factors. Namely, the pedagogical criterion (the level of general physical fitness of the young athlete) and the level of their motivation to engage in athletics. As for technical and tactical skills, at the initial selection stage they cannot yet be formed to a sufficient degree to be taken into account. The health condition of the finalists of the project allows them to take part in athletics competitions.

The level of motivation of the young athlete was determined using a special test, which was conducted with the project participants before and after the final competitions. The test was a questionnaire of five simple questions, for each of which it was necessary to choose one of the proposed answer options: I don't know; I want (I like); I really want (I really like); I don't want (I don't like). The first two questions of the questionnaire were aimed at determining the attitude to athletics. The third, fourth and fifth questions were aimed at determining the attitude to specific types of athletics disciplines and determining the supposed specialization (figure 1).

The test results were calculated as follows: the points for the answers to questions 1 and 2 were summed up (f_{max} = 5 points). The points for the answers to questions 3, 4, 5 were calculated separately (f_{max} = 3 points each).

The point (the highest) for the answer to one of questions 3, 4, 5 was added to the sum of the points for answers to questions 1 and 2.

Questionnaire

Dear friend, please read the questionnaire carefully, think and answer the questions honestly. Note: underline the correct answer.

1. **Do you enjoy participating in athletics competitions as a participant or a spectator?**
   I don't know; I like it; I like it very much; I don't like it.
2. **Do you want to do athletics?**
   I don't know; I want; I really want; I don't want.
3. **Do you want to do running athletics?**
   I don't know; I want; I really want; I don't want.
4. **Do you want to do jumping events in track and field?**
   I don't know; I want; I really want; I don't want.
5. **Do you want to do track and field throwing?**
   I don't know; I want; I really want; I don't want.

Last name First name_____ Year of birth
_____Thank you for your honest answers.

Figure 1 – Form of the questionnaire for determining the level of motivation of a young athlete

In this way, the motivation levels of the survey participants before and after the competitions were determined. By calculating the median of these levels, the generalized motivation level of each young athlete was determined, which is a dimensionless value that takes values from 0 to 8.

For example. A young athlete scored 5 points for questions 1 and 2 (2 + 3) in the questionnaire before the competition. He scored 2 points for question 3, 0,5 points for question 4, and 3 points for question 5. His result before the competition was: 5 + 3 = 8 points. After the competition, this athlete also scored 8 points in the questionnaire. The median of the test results was 8 points, which is interpreted as a very high level of motivation for athletics.

The obtained results were interpreted using table 1.

The level of general physical training of young athletes was determined based on the results they showed in the disciplines of the project finals: hurdles, standing long jump, ball throw. The athlete's intra-group rank (place) was determined in each of the named disciplines. The sum of the ranks taken by the athlete in the three disciplines was ranked, which determined the intra-group rank of the young athlete.

Table 1 – Interpretation of the survey results

Points	Interpretation
0–1	Lack of motivation
2–3	Low level of motivation
3–4	Average level of motivation
5–6	High level of motivation
7–8	Very high level of motivation

The weighted intra-group rank R of young athletes based on the results of the general physical training competitions was determined using the following formula:

$$R = 1 – (Rreal-Rbest) / (Rlast-Rbest),$$

where Rreal is the athlete's real rank in the group, Rbest is the highest rank in the group, Rlast is the last rank in the group. The R indicator takes values from 0 to 1.

It should be borne in mind that calculating the weighted intra-group rank of a young athlete has practical meaning when the group size is at least 30 people.

For example. A young athlete took 27^{th} place in hurdles, 24^{th} place in long jump and 2^{nd} place in ball throw among 40 competitors. The sum of his ranks (places) is 53, which corresponds to 14^{th} rank (place) among all the participants of his group.

Calculating the weighted within-group rank for this athlete yields the following result:

$$R = 1 – (14-1) / (40-1) = 0,67.$$

The integral indicator P of the prospects of a young athlete, taking into account his level of general physical training and motivation for athletics, is calculated using the formula: $P = M \cdot R$, or in expanded form:

$$P = M \cdot \left(1 - \frac{R_{real} - R_{best}}{R_{last} - R_{best}}\right),$$

where M is the level of motivation for athletics, P is the indicator of the young athlete's potential (a dimensionless value that takes values from 0 to 8).

The interpretation of the values of the integral indicator of the prospects of a young athlete is shown in table 2.

Table 2 – Interpretation of P-values

P-value	Interpretation
6,0–8,0	The prognosis is excellent
4,0–5,99	The prognosis is good
2,0–3,99	The prognosis is satisfactory
0,0–1,99	The prognosis is unsatisfactory

Example. A young athlete has a median motivation level M = 5, weighted intra-group rank of the level of general physical fitness R = 0,67. Then the indicator of the prospects of this athlete P = 5 · 0,67 = 3,33, which is interpreted as «satisfactory».

Results and discussion. As part of the study of young athletes' potential, 128 girls and 127 boys, students of grades 2–4 of general educational institutions, took part in the initial selection stage. They became finalists of the republican mass sports event «300 Talents for the Queen», held from April 17 to 21, 2024. The finalists were divided into six age groups: 40 boys (grade 2), 39 (grade 3), and 48 (grade 4); 41 girls (grade 2), 44 (grade 3), and 43 (grade 4).

The results of the ratings of the prospects of young track and field athletes among boys and girls of grades 2–4 are presented in diagram 1. Processing data was carried out with the help of Excel spreadsheets.

The study identified gifted children who were capable of participating in sports in each age group. So, among the boys (2nd grade) participated in the research three of them showed high level prospects, 11 – good, 12 – satisfactory, and 14 – unsatisfactory. In the group of the boys of the 3rd grade only one participant demonstrated high level, and 23 – good or satisfactory. In the 4th grade two participants showed high level, 11 – good, and 20 – satisfactory, at the same time, 15 boys from the 3rd and 4th grades demonstrated unsatisfactory prospects.

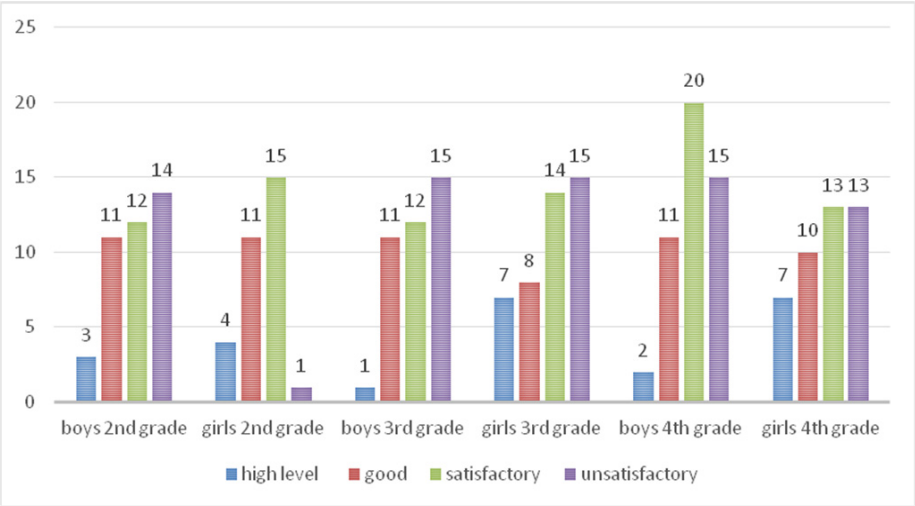

Diagram 1 – Results of the ratings of the prospects of young track and field athletes among boys and girls of grades 2–4

Among the girls, more participants with high-level prospects were observed: in the 2nd grade – 4 participants, in the 3rd and 4th grades – up to 7. A good level was observed among 11 girls in the 2nd grade, as well as among 8 and 10 girls in the 3rd and 4th grades, respectively. An unsatisfactory level was found among 11 girls in the 2nd grade, 15 in the 3rd grade, and 13 in the 4th grade.

Overall, the research results indicate a sufficient number of participants with a high level of motor giftedness. However, to obtain more reliable results, it is necessary to identify methods that allow monitoring the potential of participants to participate in sports over several years.

Conclusion. To effectively select children for athletics, it is important to consider criteria such as health, fitness level, body type, and motivation for the sport. Our proposed comprehensive indicator of young athlete potential allows us to simultaneously consider several key factors – physical fitness, motivation, and health. Using this step-by-step method significantly simplifies the work of coaches and teachers when forming initial training groups and facilitates a more targeted selection of young athletes who demonstrate high motivation and the potential to achieve high athletic results.

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