

Current problems in the development of young athletes

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ABSTRACT

Current problems in high-performance athletics call for coaches and other specialists to understand the situation and put pressure on them to identify methodological and organisational solutions. In particular, there is a need to find reserves or new potential for improvement within the system of long-term development that takes beginner athletes to the elite level. The responses to the problem of decreasing talent pools in Russia and most of Europe, which include the naturalisation of proven talent and children from other countries and the acceleration of the long-term training process for young athletes, have biological components. These have not been adequately discussed, even though they have many implications for the athlete development process. The author's main focus is on the biological maturation of young athletes, for which he gives an overview of the main stages. As there are inter-individual differences of up three years in the rate of maturation, he argues that athletics training, and even the competition system, must be appropriate to each individual's stage of development, regardless of the chronological age. He also gives a biological perspective and general advice on issues in the areas of sport psychology and talent management.

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Introduction

In the present stage in the development of high-performance athletics, which is characterised by professionalism, commercialisation and globalisation, there are certain problems that require methodological and organisational solutions. This reality puts pressure on coaches and other specialists to understand the situation and find reserves or new potential for improvement in the system of long-term development that takes beginners to the elite level.

In most of Europe, including Russia, there are new difficulties in the work of developing youngsters capable of showing great results in competitions. The most obvious of these are demographic and lifestyle changes. It is a fact that the number of children, especially the number of primary school pupils, is decreasing. Moreover, changes in eating habits and leisure activities have had profound effects on children and made it harder

to identify those with the capability and interest to develop sports skills. With a smaller talent base to draw on, there is increasing competition both between and within sports for the remaining pool of gifted individuals.

In response, some countries have tried to maintain their relative level of success on the world scene by naturalising proven talents from other countries, particularly former colonies in Africa and the Caribbean, and paying particular attention to children from these communities within their countries as sources of talent. In time, this trend may result in an almost full replacement of European aborigines on some national teams participating in the Olympic Games, World Championships and European Championships.

Another response has been for some coaches to start training children at a younger age than is recommended by specialists in sport medicine. This has led to intensification of the training process in its early stages. What negative results can this shift to an early start to serious training mean for a young athlete?

In both cases, it is clear that there are important biological components. These have not been adequately discussed even though they have implications for training, sport psychology, talent management and the competition system. The aim of this article is to discuss these issues and thereby contribute to the understanding of the process of the development of young athletes in the current environment of the sport.

New realities in athlete development

The ideal of starting athletics at the age of 9–10 with general training-like activities followed by a transition to specialised training at the age of 12–13 has been well documented³. In practice, however, we see that often the natural and varied physical activity in the family, in the kindergarten, at school, at callisthenic clubs, etc is being substituted by highly focused training in one or a group

of related athletic disciplines at a young age. This, in fact, is having the opposite effect to that which is intended and places certain restrictions on the athlete's sport career and limits his/her potential results^{6,8}.

It is known that the younger the child, the more difficult it is to forecast the possibility of him/her achieving the highest results¹⁰. According to various authors, the informative accuracy and value of testing 8–9 year-old children entering sport schools is estimated to be between five and 10%. In older children, the accuracy of indices of potential increases^{6,7}. This is at least partially due to the fact that children of the same age can have different physical characteristics and capacity for work, the result of difficult to detect biological processes not strictly related to the chronological age^{8,9,10}.

There is also a psychological dimension. The 7–8 year-old child cannot choose an appropriate kind of sports by himself/herself. Though parents and schoolteachers give them a hand, children are not able to realise the principle of consciousness in training and learning, they do not feel any psychological comfort or satisfaction from their efforts. The result is that they can give up athletics too soon. Experience in Russia shows that sport schools lose young athletes on a constant basis: 67.7% of athletes attend the groups of beginners at sport schools (9–11 years-old); 31% attend the groups of learning and training (12–15 years-old); 0.8% attend the groups of sport perfection (15–17 year-old); and only 0.5% attend the groups of the highest skill (older than 17 years). Note that, the largest number eliminated is observed in the younger groups. Importantly, this is not only due to their athletic results but it is also because of the psychological orientation of the students.

The history of highly qualified athletes proves that, generally, the earlier the child starts training in some kind of sport, the shorter his/her sport career will be. Sports calling for complex coordination can serve as

a good example⁶. Moreover, the earlier a child starts specialised training, the shorter his/her stage of highest results will be, and the level of the results will be lower than the potential determined by the individual's genotype.

Maturation and training

Training should be aimed at the development of all physical abilities but it must be appropriate for each individual's specific stage of biological development. Ideally, young athletes should start out in groups doing general training and continue for two to three years. They will then be well prepared for specialisation work, again in groups, for related athletic disciplines. Over the years of training, progress and the timing of transition from one group into another depend on the relationship between two important processes: the development of sport skills and the biological development of the individual. That is why the coach should systematically use an index of biological maturity (age) both for the process of selection and for the monitoring and control of training in general.

When an individual child's development is accelerated, the biological adolescence begins early, takes place fast and quickly comes to an end. In this case, the development of some physical characteristics is also accelerated. Children and teenagers with late biological adolescence and slow development of physical characteristics are considered to have retarded development². However, the differences that can be observed cannot be taken as accurate criteria of athletic potential, because by the age of 18 the so called retarded individuals can overtake the accelerated ones and they often show a better level of preparation and better results in athletics. In fact, both true acceleration and retardation are rare among promising young athletes. More common are what can be considered combined cases, where the growth rates of some important athletic and biological parameters are constantly changing^{2,8,12}.

Young athletes can be up to three years of biological development behind or ahead of their chronological age. Thus at the age of 12 (the best age to start specialised training), the biological age range is actually between nine and 15 years. However, most coaches assess the level of preparation and potential using the same criteria for all children. In the environment of a sport school or club, it is impossible for practical reasons to determine the biological age using complicated medical technique (radiography). Therefore, the coach and the doctor should use available methods based on the development of the secondary sexual structures described in medical and sport literature^{3,6} for more accurate evaluation.

Some specialists believe that most accelerated children (girls in particular) give up their careers in sport by the age of 19 years, while children who go on to long careers in sport tend to be those whose development was originally classified as normal or retarded. This can be explained from both biological and psychological points of view^{10,12}.

The natural alternation in the process of individual development of the most important body functions and physical characteristics, during the sensitive periods of body growth, demands special approaches to organisation of competitions and methods of training at different ages. The beginning of certain periods of development depends on the rate of biological maturing, the genotype of the athlete (his/her hereditary features) and his/her phenotype formed under the influence of outside factors – environmental and social – on the young athlete's organism. However, no methods of training can overcome the limiting influence of some morph-functional, genetic, or rigidly determined parameters^{10,12}.

Biological maturity patterns are somewhat conditional but the following five stages² are commonly acknowledged:

Stage 1: The pre-adolescence period (ages 7–10) precedes the beginning of the

adolescence period. Children have high co-ordination abilities, but their physiological functions are not sufficiently developed and their regulatory systems, the endocrine system in particular, are not mature. This makes the child's organism pay dearly for any adaptation demands.

Stage 2: The beginning of the adolescence period (boys: ages 11–12, girls: ages 10–12) is characterised by the increase of hormone secretion when growth and pubescence processes are activated. The process of synthesis results in the muscle mass increase. Regulatory processes are not perfect yet and this fact has its impact on the work capacity, endurance in particular. At this age, however, children have good abilities for acquiring speed, strength and agility.

Stage 3: At this stage (boys: ages 13–15, girls: 1-2 years younger) the function of the sex glands is stimulated (by testosterone, estrogens, etc.). Body mass and height increase quickly but the muscles and fat components lag behind. The growth of the heart and lungs provides for the vital capacity of the lungs and the heart volume to increase. Aerobic training capability is raised but the capacity to fully benefit from exercises for strength development is still limited.

Stage 4: Adolescence (boys: ages 15-16, girls: 1-2 years younger). The development of the secondary sexual structures is almost finished. Male and female sexual hormones are in full production. The rapid growth is over; the type of build is formed. The heart and lungs continue to develop. There is considerable growth of fast (white) muscle fibres of the second type. These fibres have powerful retractile qualities and anaerobic-glycolytic energy supply. Work capability is increased; all physical abilities are being developed efficiently.

Stage 5: The end of adolescence (boys: ages 16-18, girls: ages 15-16 but sometimes 13-14). The timing of the end of ado-

lescence can vary both ways in individuals. It depends on hereditary factors and the constitution, or somatic, type. A slow type of adolescence is observed in lightly muscled asthenic, ectomorphic children and those of an asthenic-thoracic body build. In the representatives of more muscular types, the process of adolescence is finished 1.5–2 years earlier.

Some believe that intensive training can slow down the processes of adolescence. On the other hand, some think that the loads during training and competitions can only stress the inherent type of development and prolong its coming^{3,10}. The greatest differences between the chronological and biological age of most young athletes is observed between the ages of 11 and 15.

Sport psychology

In modern athletics, differences between the performance levels of ethnic populations are quite obvious in some event groups. In the sprints, Afro-Caribbean athletes are dominant. Bringing African people to the countries of North and South America and the Caribbean and exploiting them over generations during the period of colonisation was, in fact, a selection process that identified the strongest and most physically fit individuals. Later, selection through sports identified a population of athletes capable of the speed and explosiveness required for high-level results in both athletics and game sports.

In the middle- and long-distance races, athletes from North and Eastern Africa and medium-elevation mountain regions win as a rule. The moderate hypoxias of these regions and the centuries-long influence of the Mediterranean subtropical and subequatorial climate have led to certain changes (mutations) and evolutionary selection in the peoples of these areas. The result is that they are able to perform physical work at a lower oxygen level, an ability that their descendents retain for several generations after they move to areas of lower altitude.

In the other disciplines, we do not yet see a situation where general biological factors lead to the same type dominance by certain groups.

The evolutionary adaptive changes in representatives of some nations are connected with morphological features, the most noticeable of which are: lengthened body proportions, large thorax and the composition of fast and slow muscle fibres. These advantages become apparent at junior age.

Importantly, this situation often has negative impact on the psychological state of young athletes who do not have such advantages. However, there are many examples of success in both the sprints and distance races by athletes who are not of Afro-American or North/East African origin. That is why coaches must pay great attention to psychological training and to the system of orientation and selection of talented individuals at all the stages of long-term development. These can help athletes of other nationalities achieve high results and win significant victories.

The most important thing for improving young athletes' skills is the perfection of training techniques at the basic stage of preparation in particular. This is based on the principle of the unity of general and special training. Premature introduction of highly specialised and intensive preparation exercises results in a speeding up of the training and negatively affects the level of performance at the stage of the highest achievements. Vice versa, over-extended use of general preparation exercises, the form and content of which do not correspond to main competition exercises, slows down the level of a young athlete's preparation as there is almost no transfer of the training level from general preparation exercises to competition ones¹.

At the stage of basic preparation, when the coach is solving the problem of a train-

ing mix that will determine the further specialisation of the athlete, the use of a large complex of general preparation exercises and exercises from other events and kinds of sports leads to a higher level of general fitness and helps the athlete to master a wide variety of motor skills, which in turn provide the basis for further perfection in the chosen discipline^{6,9}.

There is no doubt that as a young athlete develops, the share of general preparation exercises must gradually decrease and that of special preparation exercises must increase. The interrelation of these two groups of exercises though is connected both with further narrow specialisation of young athletes and with the individual level of their fitness. It is often difficult to divide the exercises into those of general preparation, special preparation and training for competition. It is mainly true of stretching and coordination exercises.

Talent management

The problem of determining the capabilities and potential of a young athlete for his/her gaining a certain level of results has still not been studied properly. An individual's capabilities are determined not only by his/her physique but also by the genetic ability to develop the body in the course of the whole sport career. As athletes approach the maximum possible level of development predetermined by their genes, a fight begins between the reactions increasing sport-related working capacity and the organism's protective reactions hampering the physiological and biochemical functions that ensure such capability for work^{1,11}. This corresponds to the principle of general biology that maintains: an increase in the intensity of a body system's function is always accompanied by an increase in the power of the braking mechanisms that ensure the demobilisation of these systems and so their high reliability⁴. This is why we often observe that the level of performance by some highly qualified juniors begins to go

down before they have shown top results at the senior level.

An example of the above mentioned principle might be seen in our comparative analysis of achievements of the best sprinters in Russia and the world. The best youth and junior results of a random sample of ten sprinters of different ages who have run 100m in less than 10.0 sec in the last 10 years were compared with the best results of the winners of the last ten Russian 100m championships for youths (17 years old and younger) and juniors (18-19 years old). In the youths, this correlation is ($X \pm S$) 10.71 ± 0.25 sec. and 10.84 ± 0.13 sec. correspondingly. The difference between the two groups is not statistically reliable ($t=1/0$, $p=>0.05$). In the juniors, the correlation is 10.25 ± 0.26 sec. and 10.64 ± 0.17 sec. The difference here is highly reliable ($t=4.33$, $p<0.01$). However, for the group of the world's strongest sprinters under the analysis, the average best performance improved to 9.87 ± 0.05 sec. while the Russian sprinters show almost no progress.

It is not clear why the best Russian youths cannot make same degree of progress as their competitors from around the world (all of Afro-Caribbean origin). There may be separate and combined influence of several factors at work: individual, genetic capabilities of the body development; a predominance of accelerated children among the winners at the Russian youth and junior championships; the methods of training applied in the early stages of the different group's careers; running technique; or ethnic prerequisites. This is certainly an area where the need for further study is indicated.

Competition

The competition results of the most talented athletes (in methodical expression) at youth and junior age should have similar development dynamics in every type of sport⁵. However, analysis of the marks

achieved by the winners in the IAAF World Junior Championships in Athletics from 1986 to the present shows negligible progress in most events, the exceptions being the men's distance races. In some cases, especially in the women's throwing events, the marks even show some regression. Over the last 20 years, the senior elite in most athletics disciplines have achieved record results. It is rather a conformance exception that we don't see the same degree of progress in the winning marks at the world junior championships. This suggests that, in most cases, the development of the results of young athletes is closely connected with the body's growth stages⁵.

Competitions are, of course, important components of the system of young athlete development as they determine the essence of sport itself. However, the goal of the competition system and the competition disciplines should change greatly at each stage of development over the years of development. The coach should keep in mind the fact that, initially, most children go in for sports mainly in order to play. Although they want to win competitions, they have very low motivation for attaining high-level performances. Therefore, in athletics, the competition system at the beginning of the development process must correspond to the child's urge to play on the one hand, and the coaches desire to exercise control of the preparation on the other hand.

In these early stages, competition activity should not be much specialised. The results attained should not be seen as a criterion of the child's potential. In the next stages of primary and advanced specialisation (ages 12-15) the competition system should become more specific. In youth and junior age competitions, the system becomes more and more specific. Here, the results attained are of critical importance for the athlete's prospects. The youth and junior competition system itself should have a strict hierarchy, which means that higher-

level competitions must take priority over lower-level ones, and that competitions take place in the appropriate sequence.

It is important to make the correct choices about the number of competitions, their frequency and the level of competition. The coach should properly assess the loads and take into account the individual athlete's reactions. At the junior age, coaches should be very careful about long duration Grand Prix-type series, as they place great and dangerous strains on the body and mind of a young athlete.

Conclusion

The issues mentioned above are very rarely considered in the literature. Nevertheless they have a great significance in modern athletics. Hopefully the discussion of them will help coaches and other specialists to improve their work and the long-term results of their athletes.

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REFERENCES

1. BONDARCHUK, A.P. (2007). High-class athlete training management. Moscow: Olympia Press.
2. VLASTOVSKY, V.G. (1976). Acceleration of growth and development of children. Moscow.
3. TIHVINSKY, S.B. & KHRUSHOV, C.V. (Eds.) (1991). Sport medicine of children (doctor's manual). Moscow: Medicine.
4. MEERSON, F.Z. (1973). General mechanisms of adaptation and prevention. Moscow: Medicine.
5. NIKITUSHKIN, V.G. & IVOCHKIN, V.V. (1985). Age regularities of athletes sport skills development. "Nauchno-sportivny vestnik", N2.
6. POPOV, V.B; SUSLOV, F.P. & GERMANOV G.N. (1999). Track and field athletics for young people. Moscow: Voronezh.
7. SIRIS, P.Z.; GAIDARSKA, P.M. & RACHEV, K.I. (1983). Selection and prognosis of capabilities in athletics. Moscow: "Fizkultura i sport".
8. TIMAKOVA, T.S. (1974). Many year training of a swimmer and its individualization. Moscow: "Fizkultura i sport".
9. BORMS, I. (1986). The Child and Exercise: an Overview. Journal of Sport Sciences. N4.
10. HUDSON, R. & ALLINSON J. (1987). L'enfant dans le sport de competition. Sciences et sport, 2, p.17 – 30.
11. TANNER, J.M. (1962). Wachstums und Reifung des Menschen, Stuttgart.