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## SHORT COMMUNICATION

# The Development of Basketball Players: Current Perspectives and Future Directions

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## Abstract:

The identification and development of talent in basketball has been seen as a dynamic and complex process. Furthermore, there are numerous factors that play an important role in the evolution of the basketball player during childhood and adolescence. In this brief review, we critically analyze the main factors to be considered in the development of young basketball players. Furthermore, it focuses on the importance of key variables considered in the talent detection process and in long-term development programs. It can be concluded that the maturational status of young basketball players should be considered in the formulation of test batteries for talent detection and in long-term development programs to ensure that potential talents are not excluded due to late maturation in relation to their pairs.

**Keywords:** Young, Evolution, Talent detection, Long-term development programs, Maturation status

## Introduction

The contemporary requirements of competitive sport increase the need for constant search and extension of knowledge that allows for a better understanding of the phenomena that accompany the training process of young talents. The identification and development of talent in sport has been seen as a dynamic and complex process where several factors interact along the development path of sports practitioners (1). These factors that influence the athlete's development and talent, may be genetics, training structure, coach influence, family influence, psychological traits (2–4). Additionally, by participating in training and skills development programs, the accumulated practice will play an important role on the acquisition of motor skills. Some authors indicate that 10,000 hours of practice are needed to achieve sporting excellence (5–8). The identification and development of talent in sport must be an integral part of the development plan of any sport since and it is only possible to fully develop the potential of talented athletes through the possibility of participation in stimulating and guided activities (9). The complexity that supports talent identification adds additional challenges to predicting long-term success, particularly when considering the early stages of development (10). Regarding sports with low penetration in the population such as basketball, there is a greater need to implement programs to detect sports talents based on objective and perfectly measurable data (11). Specifically in basketball, talent research is carried out based on good indicators of strength, explosive strength, speed, agility, cardiorespiratory capacity, in addition to predicting high height in adulthood (12–14). However, the physical performance observed during youth is mostly unstable and may present lower associations with adulthood performance (15). Furthermore, changes in body composition and cardiopulmonary and neuromuscular systems derived from maturational status can also influence the motor performance (16). Thus, devaluing the maturational status of talent identification and development programs can facilitate the exclusion of children with potential (17). Therefore, it is essential to consider the growth and maturation processes during detection and later during the application of development programs, to assess the determining factors for young basketball players success (18,19). Through complex and multidimensional processes, it is possible to achieve basketball expertise. Long-term development is a planned and systematized preparation in different stages, which aims to boost the performance of basketball players from childhood to adulthood.

This review highlights perspectives on the main factors to be considered in the development of young basketball players. Furthermore, it focuses on the importance of key variables that must be considered for talent detection and long-term development programs. To carry out this review the available literature was investigated through searches in the electronic databases Web of Science, Pubmed and SPORTDiscus (between 1st November to 1st December 2021) for relevant publications (between 1988 and 2021), using the keywords “basketball”, associated with the terms: “talent“, “long term development programs”, “maturational status”.

The inclusion criteria for these articles were: (1) article contained data related to talent detection and development in basketball; (2) contained data related on the importance of maturational status in young basketball players; (3) included male and female basketball players from childhood to adulthood and (4) the articles were published in English. Studies were excluded if: (1) did not include data related to talent detection and development or the importance of maturational status in basketball players; and (2), were conference abstracts (Figure 1). To evaluate the quality of the studies, an validated protocol was used (20). The articles were

evaluated based on: objective, relevance of the basic literature, adequacy of the study design, sample included, informed consent procedure, outcome measures, method description, results significance, analysis, practical importance, description of dropouts, conclusions, practical implications and limitations. All sixteen quality criteria were scored on a binary scale (0/1) that served to define methodological quality.

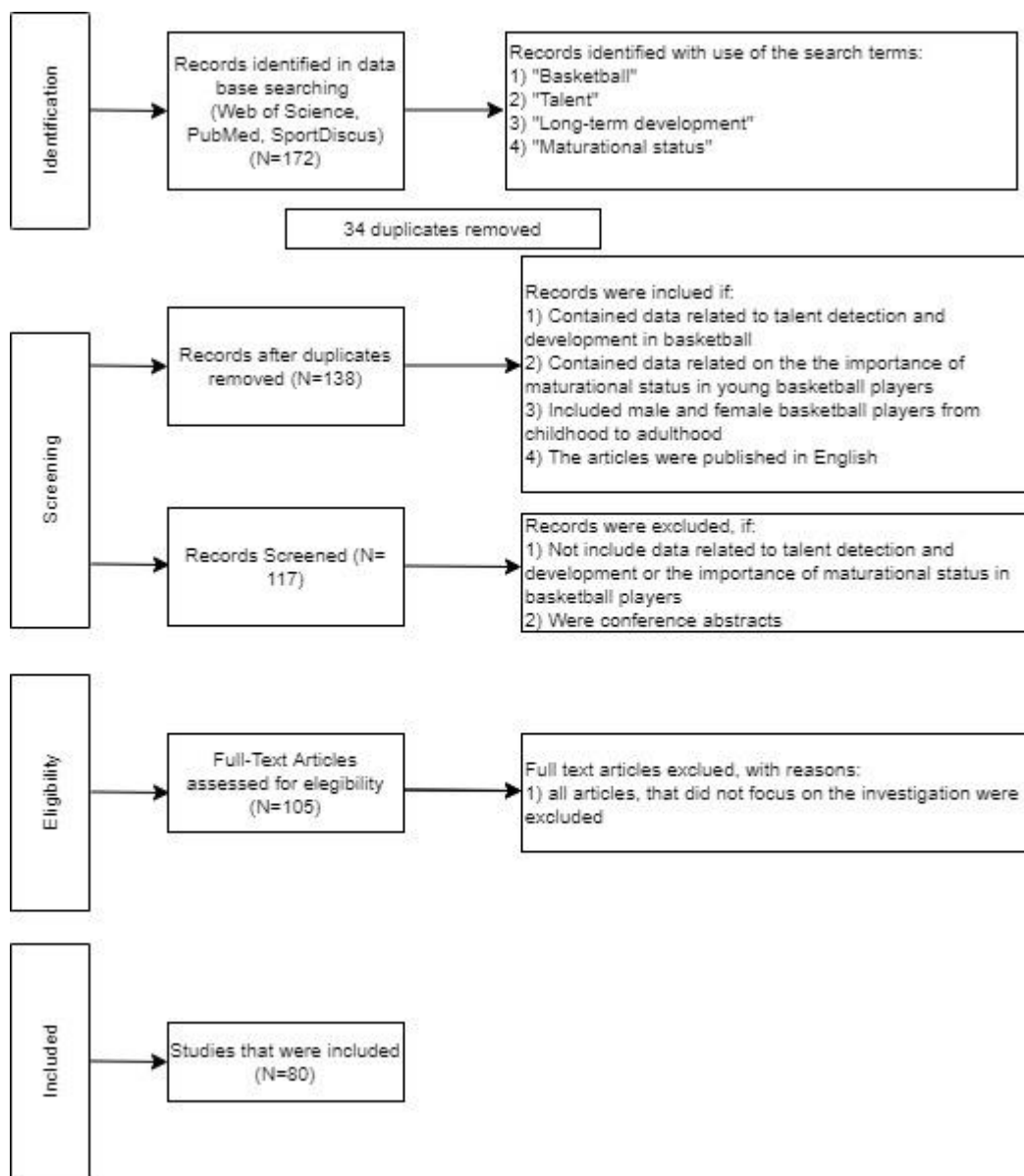


Figure 1. PRISMA 2009, flow diagram

## The sport preparation of the young athlete

The long-term development process in basketball players is long and complex, as it is influenced by a large number of variables such as training, psychological, physiological and genetics (21). The combination and interaction between these factors determine the possibilities of evolution. However there is no consensus regarding the age at which specialization should begin (22–24). In fact, training at an early age must be characterized by a unique specificity, as a result of the inter-individual differences presented by the participants. These differences are enhanced by the fact that the training of young people is not governed solely by the principles that support the training of adults, whose main objective is to obtain excellent performances evaluated through different methodologies.

The role of the coach is fundamental in working with young people, this should be guided by the inclusion of the sports process in symbiosis with the educational and training process of the participants (25,26). In fact, the training process must be understood as a teaching-learning process as the level of acquired content depends on the athlete's ability to learn and the teacher's ability to teach (27). Therefore, it is up to the coach to direct the athlete's long-term development process, which must be properly structured (28,29). A previous study highlights the idea that training in young people is not properly structured throughout the training process, because it does not present final objectives focusing only on the immediate (30). However, the training process must be a long-term preparation process, which enables the achievement of high levels of performance in adulthood, integrating and articulating in a balanced way the different levels of sports practice (9,30,31). The initiation of sports practice should not be understood exclusively as the first stage in the formation of a future elite player (32), in order to avoid the fostering of excessive expectations in children who are referred in this process, which may create great pressures and external constraints that lead the child to abandon sports practice early (33). To this extent, it is not advisable for children and young people to dedicate themselves exclusively to the practice of a single sport, to the detriment of participating in other aspects of assumed importance in their development as an athlete and as a person (34). This idea is supported by other studies (32,35–37) reporting that the basketball player training process must evolve through a series of stages in which athletes learn and develop different skills (i.e., physical, technical-tactical and psychological). Learning can be established as one of the main priorities in training with young people and children, related to the culture of the sport and its techniques, and should evolve from the simplest to the complex, where only when the simplest is well executed the athlete may reach a most complex task (38). Thus it is recommended an organization of the athlete's evolutionary structure, the so called stages of sports preparation (39,40). The existence of training stages in the athlete's development assumed that the training process must take on different contours, according to the athlete's stage of development, with different levels of practice throughout sports preparation (41,42).

The levels must be established a priori in a structured plan with the objectives inherent to each stage (i.e., level of practice) since, without long-term planning, the coach will be applying a decontextualized plan that may not meet expectations (43). To this extent, two major levels of sport preparation can be considered, i) training, whose preparation focuses on the general development of the athlete, intending to create bases that serve to effectively develop the specific motor skills of the modality ii) specialization, in which acquisitions are targeted specifically to

the modality in which they are involved, in order to improve their skills, reaching a high level of performance (22,43,44).

This structure is also defended by another author (9), who defends that formation must precede specialization, and formation must advocate multilateral development, in order to build solid and consistent foundations. Sport preparation can then be understood as a set of steps that promote the correct development of the athlete and that can lead him to achieve excellence as a practitioner of the sport and, above all, as a human being (45). Throughout the entire development process, it is essential to have the child as a priority, considering the inter and intra-individual differences that exist throughout the various stages and also the characteristics of the modality.

## Trainability during childhood and adolescence

Throughout the training process, the athlete goes through a set of transformations and evolutions at a physical and biological level that substantially influence the way they react to the various training stimuli that are provided by the coaches (17,46). Particularly regarding transformations, there are two variables with higher importance, the growth and maturation (16,47,48). According to Malina (49), the growth refers to the increase in body dimensions and maturation corresponds to the time and pace at which the process of gradual acquisition of the adult or maturity state takes place. Although growth is a relatively easy aspect to assess, there is some difficulty in assessing maturation (50). This can be evaluated through morphological age, bone maturation, secondary sexual characteristics, relative height, and height growth velocity peak (51,52). Determining the peak height velocity, which is the maximum height growth rate that occurs during the period of greatest growth, allow to the selection of training stimuli that will be promoted with different athletes (53). This is because the determination of the moment when the peak of growing velocity occurs allows an adequate planning of the optimum moment to develop a certain capacity and/or learning, this moment being called the sensitive period (53).

The sensitive period is characterized as a period which the individual is particularly predisposed to learning, or susceptible to the influence of a particular stimulus (53). The analysis of several training factors reveals that there are optimal moments for the development of strength, endurance, speed, flexibility and acquisition of motor skills and these factors have been widely studied (54–58).

However, the promotion and development of conditional abilities is not limited to the developmental periods, in fact, at an early age, strength, aerobic and anaerobic power can be trained. However, the expected results will always be inferior to those of individuals with more advanced ages, therefore occurring distinct adaptations to similar stimuli (59,60).

These data reinforce the idea of children's adaptive potential, and it is essential that coaches who guide children and young people know their characteristics and particularities so that they can progressively promote structured and guided musculoskeletal development, avoiding disorders in development and consequent injuries that can affect the progression of the young athlete.

## The detail of growth and maturation in young athletes

Most of the research carried out agrees that the anthropometric and physical patterns of young basketball players are different among various competitive levels (61–66). Even though the determinant role of the previously mentioned variables in the basketball players' success is recognized, the complete clarification of the magnitude of their influence is still far from being reached. In fact, none of these factors alone can explain the process that leads to sports success in basketball and, in this sense, the maturational status seems to be the critical variable for early detection (62,67). Although the division by age groups can be considered in several aspects as an ideal strategy to group young players, this type of grouping brings limitations. This is since even though the group may have the same chronological age, there are significant differences in the level of biological maturity given that some of them may mature later or earlier compared to their peers (68). This factor assumes special importance during the detection and development of talents in basketball, since the delay or advancement in the maturational state has direct implications for physical development, motor skills and psychosocial skills (68,69). Variation in maturational status is mainly under genetic regulation, although it can also be influenced by external factors (16,19). A previous study shows that individuals with the same chronological age can vary in terms of skeletal age up to 5 to 6 years (70). During adolescence, the timing of maturation and the onset of puberty is mostly the result of genotypic factors, although it can be influenced by interactions of factors behavioral (i.e., perceived stress, poor nutrition) and environmental factors (i.e., coach pressure) (71). Usually boys, who are in a state of early maturation, are heavier, taller and have greater muscle mass, so there is a tendency for them to perform better in tasks that require high levels of strength, speed and power (19). The same can be said for girls, based on previous research that indicates that girls who mature early tend to be stronger and more powerful than those who mature later (72), and these differences are dissipating with advancing age (73). That said, we can say that adolescents in advanced stages of maturity can have an advantage in sports such as basketball where height, strength and power are factors that affect performance (74). Therefore, due to the prevalence of the aforementioned variables, girls and boys who reach maturity early are more likely to be selected to represent teams and participate in long-term development programs in basketball (62,74). On the other hand, those who reach late maturation have less chance of success and of being identified as talented, which makes athletes with high potential for basketball practice to be lost or ignored without ever having the opportunity to demonstrate his value (75).

Height is usually accepted as critical to basketball success, and although size itself is important in young players, this cannot be confused with the inter-individual differences existing at the time, growth rate and sexual maturation (76). Specifically, some youngsters may be taller than their peers due to early maturation, but the advantage associated with size may be transitory and have a differential impact on functional characteristics (76). In this sense, the existing information about the maturation status of basketball players is limited (75–78). So far it is known that among players aged  $\leq 12$  years, skeletal and chronological ages tend to be usually similar, while in players aged 13–15 years, skeletal ages tend to be earlier than chronological ages (79,80). Although the interactions between size and body composition have been considered (61,64), the influence of inter-individual differences as a consequence of biological maturation as a determining factor for the performance of functional abilities and specific game skills still does

not incorporate the selection process and long-term development programs in basketball.

## Conclusions and suggestions for further research

This brief review emphasizes the need to consider individual growth differences during the selection process and during the application of long-term basketball training programs.

The analysis carried out allows us to conclude that some athletes reach higher maturation states first, which tends to be a determining factor for the potentiation of the performance of individuals in the initial stages. Following new research trends and in order to fill the gaps evidenced in the literature, future research should focus on formulating specific test batteries for talent detection and long-term development training programs that allow coaches to consider the maturational status for early talent detection. These data would be extremely important and could be useful to prevent some athletes with potential talent from not reaching levels of excellence due to delays in the maturational state when they are evaluated to integrate long-term talent development programs. Some of the findings may provide new insights for researchers, coaches to carry out evaluations and/or prescriptions in order to ensure that the success of the actions taken is not the result of advantages arising from more advanced maturation states, balancing the balance for everyone at the time of selection. This would undoubtedly be an inclusive and promoting measure, which would allow more athletes to show their value, through selection to incorporate long-term development programs in basketball.

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