



Comprehensive approach to physical skill in different age groups in sports games: A review

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ABSTRACT

The formation of young athletes is very important and for this it is necessary to build appropriate training programs that help them grow, develop to have results in sports activities in which they participate. Methods: This literature review was conducted in accordance with the guidelines for meta- analyses of (Tricco et al. 2018), to address the research questions. To collect the data for our study, 4 bibliographic databases (PubMed, Scopus, Web of Science and Pro Quest) were used using the Jab Ref program. Results: From 105 articles in incompatibility with the concept of dexterity, speed, strength, coordination only 23 scientific articles that matched our requirements remained for our study. Conclusions: From this study some light can be shed and some recommendations can be made to guide future research efforts. Data from several studies have identified that combined training programs can be considered a safe and successful method when working with adolescents. Training and testing of athletes must be structured in specific ways. Assessments are important for coaches to identify athletes' strengths and weaknesses in order to adapt and apply the appropriate training method. Comprehensive assessments are needed to draw conclusions about the origins of changes in agility and coordination performance.

Keywords: Sports games, Training programs, Speed, Strength, Agility.

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INTRODUCTION

Early childhood marks the beginning of the development of the first motor movements. Children develop gross motor skills, which include movements that rely on the coordination of the large muscles of the body, such as: walking, grasping, climbing and jumping, motor skills that children develop in the first stages of life and that are perfected with age. Also, during early childhood, they develop fine motor skills that are small and precise movements (Bompa & Carrera et al. 2015). Both gross motor skills and fine motor skills are practiced and learned during their daily lives, in kindergartens or at home, while they run, play, catch and throw different objects says (Bompa & Carrera et al. 2015). When working with children aged 11 - 14 years, it is recommended that the training intensity be increased to improve athletic performance. At this stage of their development, some athletes are likely to show a growth spurt (a 14-year-old playing sport can show large changes in physical potential similar to that of a 16-year-old), according to (Bompa & Carrera et al. 2015) and as a result manifest a lack of coordination during training. At this stage, the emphasis must fall on improving the qualities and skills of athletes and not on physical performance or winning during competitions/matches. To achieve the most satisfactory results according to (Bompa & Carrera et al. 2015), it is important to consider some guidelines such as:

- The combination of a series of exercises that are related to the specificity of the sport they practice as well as other sports, increasing both the intensity and the volume of training;
- The use of a series of exercises that will help young athletes perfect the basic skills learned so far and develop complex skills that affect the improvement of concentration;
- Emphasis is placed on the training of coordination, flexibility, and balance;
- Inclusion in training programs of exercises that develop in young athletes general strength, power, aerobic capacity and endurance as well as moderate anaerobic training that prepares young athletes to cope with high-intensity anaerobic training that helps during the specialization phase.

The formation of young athletes is very important and for this it is necessary to build appropriate training programs that help them grow, develop to be healthy and have high results in sports activities in which they participate. According to (E. Lleshi & V. Rizvanolli 2014) in their scientific research, have analysed separate aspects of the jumping ability development of volleyball players through the employment of special exercises in the training process. According to (E. Lleshi & V. Rizvanolli 2014) achievement of high results in the development of these components depends on the employment of a special evaluative test system in the training process, which will evaluate the muscle strength and jumping ability of athletes at any stage of the training process. According to authors (Asfour, H. R. et al 2022) recommend the use of harmonic abilities due to their positive impact on skill performance in volleyball. Furthermore, encouraging coaches and those in charge of the training process to use and develop harmonic abilities exercises is crucial, as they are an important, effective, and influential part of improving and developing the skill performance of volleyball players according to (Asfour, H. R. et al 2022).

The stages of development of each child are different and are accompanied by physical, psychological, emotional and cognitive changes, for this reason, the training program must be suitable for each stage of development. It is known that children of the same chronological age show differences in biological growth. The study by (Jukic et al. 2021) shows that it is important that when we evaluate the age of athletes, we should consider: chronological age; biological age in young athletes; metabolic age; sports age which refers to the years of activation in organized sports. Biological age is a very important factor in the development of organs and systems in the human body and determines and helps increase the level of physical performance both during training and competition. Therefore, coaches should consider the biological age of children when selecting athletes and when planning training programs, as it can often happen that two athletes may have

the same age, height, weight and musculature but they are biologically different and exhibit different skills to perform a required exercise. For these reasons, it is important to assess individual differences in biological age according to (Bompa & Carrera et al. 2015). Also, it is worth taking into consideration the age and gender of the athletes as only in this way we will be able to achieve a satisfactory and efficient sports preparation indicated by (Lloyd & Oliver et al. 2012).

The methods and effects of agility training are thought to vary with biological age. Recommendations regarding age-appropriate agility training are largely speculative due to the lack of literature in this area according to (Jeffreys et al. 2019). Data from several different studies suggest that agility performance naturally improves with age (in addition to training), especially from childhood to adolescence according to (Zemková & Hamar et al. 2014). (Harrison & McGuigan et al. 2019) they say that adaptation of training to improve agility is not attributed alone to influences of exposed training stimuli but also the natural processes of development of young athletes.

It is difficult to distinguish between natural development and adaptations from exercise in young athletes say (Matos, N., & Winsley, R. J. 2007).

From what was said above, we conclude that it is necessary to take into account the aspects of growth and maturation of young athletes by regularly monitoring body height and mass, as they affect both the ability to train and the natural development of dexterity during childhood and adolescence (Harrison & Mc. Guigan et al. 2019). The stages of training development should correspond to the children's biological development. Thus, pre-puberty is the stage of beginning training, in this stage athletic training takes place; post-puberty is the stage of training specialization and the maturation stage where the highest performance is achieved.

Referring to the sports games and the age of the athletes that we will take for the study, according to (Bompa & Carrera et al. 2015), in the sport of basketball, the pre-puberty phase that is the beginning of training coincides with the age of 10-12 years, the post-puberty phase where they specialize at the age of 14-16 years and in the maturation phase where the highest performance is achieved, at the age of 22-28 years. In the sport of volleyball, the pre-puberty phase coincides with the age of 10-12 years, the post-puberty phase coincides with the age of 15-16 years and the maturity phase coincides with the age of 22-26 years. In the sport of football, it is observed that the stage of development of pre-puberty (10- 12 years old) and post-puberty (14-16 years old) is the same as in the sport of basketball, while the maturation stage where the highest sports performance is achieved coincides with the age of 22 – 26 years old as in volleyball players according to (Bompa & Carrera et al. 2015). According to the study of (Naughton et al. 2000), it is emphasized that in the preadolescent age, the physiological adaptation is likely to be different from the physiological adaptation of adults after the implementation of an exercise program.

Today, scientific research related to modern training programs and applied to young people may still be in progress in Albania, but the evidence base that is progressively accumulating over the year's shows a growing research activity and interest in this topic in Europe. According to a pilot study conducted in Tirana Albania (Mema, B. & Lleshi, E. 2023), the results indicated children's volleyball agility improvement of the skills scores can be achieved with a specific training model to help players improve their skills. According to (Mema, B. & Lleshi, E. 2023) show the training process of children volleyball players in Association Sports Tirana in Albania is conditioned by the factor available to develop training sessions with a specific training purpose.

This review of the literature about the models of training programs in young groups is a step toward the

selection of the most effective methods of sports training in age groups in sports.

Also, this literature review is expected to reveal data gaps and future research efforts as well as the determination of evidence related to training ability, natural development and the contribution of the main performance factors of motor skills in young people.

METHODS

This literature review was conducted by the guidelines for meta-analyses of (Tricco et al. 2018), to address the research questions. This study did not need ethics board approval as the data collected was obtained from previous studies that had ethics board approval. The study data were processed using Microsoft Excel 2019. To collect the data for our study, 4 bibliographic databases PubMed, Scopus, Web of Science and ProQuest were used using the JabRef program, as adaptive sources for the review of the literature. The title, abstract, and keyword fields were searched with search terms that included the speed, agility, strength, coordination and training programs. Eligible publications had to comply with several criteria, which were: peer-reviewed articles, books, conference proceedings, doctoral theses, articles written in English, results related to the ability to train young people, and the presence of diseases or injuries that could affect the reported results, so we only included studies that had healthy subjects. Studies that did not fit the inclusion criteria were removed from the list. If screening of the title and abstract did not provide adequate information about agility, speed, coordination, and strength, the full article was read to verify eligibility.

RESULTS

Data extracted from the review of various articles were collected and analysed. Publication characteristics (year of publication, type of study), study characteristics (age, maturity stage, gender, type of sport, performance level), and study characteristics (sample size, measurements) were entered into the Microsoft Excel system.

The results of the search and selection process are in total of 105 scientific articles were collected in PubMed, $n = 21$; Web of Science, $n = 28$; ProQuest, $n = 20$ and Scopus, $n = 36$.

Out of 105 articles were excluded according to the following criteria:

- Incompatibility with the concept of agility, speed, strength, coordination ($n = 34$),
- The age group studied ($n = 17$),
- Absence related to content ($n = 23$),
- Insufficiency of the information provided ($n = 8$).

Out of 105 articles, only 23 scientific article researchers that matched our requirements remained for our study.

DISCUSSIONS

The most significant result in the study of (Fathi et al. 2018), was that in adolescent male volleyball players, a 16-week program of combined strength and plyometric training was generally more effective for reducing body fat percentage, improving 5m and 10m sprint times, and improving the performance of muscle power than plyometric training alone while muscle flexibility was unchanged. Also, combined exercise produced positive changes in both body mass and body fat percentage. Data from several studies have identified that

combined training programs can be considered a safe and successful method when working with adolescents. Strength training can induce morphological changes (Legerlotz et al. 2016). According to the study conducted by (Fathi et al. 2018), the combined training program significantly reduced sprints (S5m and S10m) by 0.05 seconds (ES: 0.69; 6.47%; $p = .001$) and 0.07 seconds (ES: 0.31; $p = .001$), 3.47%; $p = .001$).

Therefore the authors (Fathi et al. 2018) in their study included exercises consisting of simultaneous triple stretching of these joints, combining half-squat and Bulgarian squat split with vertical jumps and showed that their impact on sprint performance was positive.

When the natural growth of children which is associated with the development of the central nervous system and neural coordination during the childhood period, is combined with plyometric training according to (Loturco et al. 2015), may result in an enhanced exercise response according to (Fukutani et al. 2014).

Some authors (Lloyd et al. 2016, and Philippaerts et al. 2006) have shown an improvement in power and strength performance in approximately 0.5 - 1.0 years, which is comparable to the findings also in the study conducted by (Fathi et al. 2018). Another study has shown that exercises requiring a high level of reactive force and maximum running speed (in boys) according to (Radnor et al. 2017) showed satisfactory results after combined training and traditional strength training.

Other studies have shown the importance of natural growth and development, training and various tests for determining agility in youth according to (Hojka & Inglis & Bird et al. 2016); (Lloyd et al. 2013), (Paul et al. 2015). However, the effects of growth and maturation were not considered in the literature review. Trainability and the natural development of dexterity with growth and maturation have been narrowly reviewed, leaving room for other more in-depth studies according to the authors (Jeffrey et al. 2019), (Lloyd et al. 2013) and (Oliver & Lloyd et al. 2017).

CONCLUSIONS

Current practical data on the effectiveness of training programs in team sports in age groups can be said to be still limited as a gap in scientific articles is evident. For this reason, in Albania, more research and evidence are needed to better understand the different factors that influence the increase in sports performance among age groups.

Based on the literature found on dexterity, different performance-determining factors have been identified such as perceptual and decision-making factors and technical and physical qualities. However, the contribution of these factors depends on the tests used to assess the skills and the environment in which the tests are performed. Studies suggest that the relationship between agility performance and physical qualities depends on the age of the athletes.

Moderate to high relationships between jump performance and agility and those between sprint performance and agility were observed in the U11 - U14 age groups. The rather high correlations observed may result from the generic stimuli applied in the dexterity tests. The influence of physical capacities is more pronounced in the changes of direction of speed "CODS", in which the perceptual and cognitive demands are mostly overlooked. Physical qualities are generally more related to CODS than agility performance.

The age factor is important in sports training. Some authors reported a decrease in physical associations (i.e.

jumping, sprinting and "CODS" performance) and agility performance with increasing age groups, since in adulthood; physical qualities and agility are poorly correlated. Factors other than physical capacity (i.e. technical, perceptual and cognitive factors) are increasingly related to agility performance in older age groups, supported by findings in sprint and jump performance.

Movement technique, perceptual and decision-making factors are of greater importance for agility performance in adults. Otherwise, among young athletes, physical qualities seem to be more decisive. Because of their age, younger athletes exhibit less game experience and shorter training history, resulting in lower perceptual and decision-making skills, inexperienced technique, and a lack of movement strategies than older athletes. The relationships between agility and sprint, jump and CODS performance were more pronounced in U15 athletes than in U14 athletes, contradicting the aforementioned findings.

The authors assumed that the older group possessed a higher level of technical skills due to longer involvement in training, which enables them to utilize their running and jumping qualities to a greater extent and convert them into manoeuvres effective agility. Age, gender, training frequency, training experience, body mass in girls and peripheral perception in boys were identified as contributing or impairing factors.

AUTHOR CONTRIBUTIONS

The contribution to this review is joint, where Blerina Mema is a PhD candidate and Enkeleida Lleshi is her scientific leader.

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No potential conflict of interest was reported by the authors.

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