

Analysis of Methods for Determining the Stage of Sexual Maturity in Youth Sports

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Abstract

It is known that at puberty the development of adolescents is very uneven, therefore, their physical abilities are also very diverse, which makes coaches think about the fact that in training groups of the same age, athletes can have different levels of both physical and psychological preparedness. In our opinion, it is very important to find a methodology that can be easily used by coaches to determine the level of puberty of athletes, to optimize the training process for youth athletes. The purpose of this literature review is: 1) to find out and compare different methods for determining the stages of sexual maturity, 2) adapt a method that can be applied in the training process for determining sexual maturity that can be easily practically applied to coaches to create appropriate, individualized training content and methodology for adolescent athletes. **Material and methods.** Analysis of sources of scientific literature. **Results.** After analysing several methods for determining the stage of maturity, we found out that all the methods found have limitations, therefore, after reviewing the literature, most often anthropometric measurements, or prediction of PHV in the long term may be practical in sport science studies, however, more accurate data on hormonal maturity are provided by blood test. **Conclusions.** After reviewing the scientific literature, in our opinion, it would be most successful for coaches to combine the method of blood tests with one of the somatic assessments to determine the stage of sexual maturity. In our opinion, it would be practical for coaches to apply non-invasive methods, but to include blood tests in the annual health examination of athletes, would provide a more accurate assessment of the stage of sexual maturity.

Keywords: Sexual maturity stage, youth sport, puberty stage.

Introduction

Puberty is a time of both physiological and mental changes for the human body. At the age of puberty in youth sports in one training group, coaches can observe a difference in the parameters of physical indicators, the execution of technical and tactical elements. Often, especially in the first stages of puberty, differences in biological and chronological age are observed in adolescents.

It is known that the training process in the annual plan should be appropriate to the individual abilities, and physical parameters of each athlete. The most difficult thing to find such an individual approach is for team sports, where players with different stages of sexual maturity play in the same team.

Studies prove that during puberty, the selection of potentially talented athletes is often carried out using methods for determining external sex characteristics (maturity status), anthropometric methods, estimating timing methods (Malina, et al, 2015). This is one of the most important aspects for coaches planning the selection of players for national teams and clubs already in youth sports to find the most appropriate method. The stage of sexual maturity plays a special role in sports where rapid speed, strength and physical contact is inevitable, therefore, it must be agreed with the authors that these athletes, who mature faster, also gain an advantage in competitions (Till, et al, 2014).

It is also important to be aware of physiological differences in the maturation of males and females during puberty. The earliest age stage when the difference in athletic performance in boys and girls can be observed is at the age of 12–13 years, which is associated with hormonal changes during puberty (Handelsman, 2017). According to the authors, the options for determining the stage of sexual maturity in boys and girls could vary, especially when testing hormones, methods can be of different gender.

Chronological age is easy to assess, but the biological age corresponding to the stage of sexual maturity is much more difficult to assess, due to the individuality of adolescence, the growth rate, and the different periods of hormonal changes (Stratton, Oliver, 2019). The most used measurement methods for determining the stage of sexual maturity in science can be divided into somatic, sexual, and skeletal (Stratton, Oliver, 2019). The authors admit that there are different methods, but no one can be called a “golden standard” these days, so it would be important to find combined methods for determining the stage of sexual maturity (Stratton, Oliver, 2019).

Research proves that long-term development in youth sport is directly based on the development of training plans for the level of debilitating maturity (Lloyd, Oliver, 2012). However, the long-term model developed by the authors, designed for athletes of average maturity speed, no mention is made sooner or later of mature athletes (Lloyd, et al, 2014). To improve long-term physical renewal, coaches need to find out the degree of sexual maturity and a long-term developmental training model should be used according to puberty level to improve the performance of athletes as much as possible and avoid injury due to inappropriate load (Lloyd, et al, 2014).

Having explored various sources of scientific literature, we found out that there are different methods for determining the stage of sexual maturity in adolescents, but we have not found a method that scientists offer that can be easily applied to any youth coach in the training process. Based on this, it would be important to find and adapt an easy-to-apply method of determining sexual maturity for youth coaches. Therefore, by analysing several methods, it is possible to evaluate the pros and cons of each method. At puberty age, it would be important to find an individualized training approach for each athlete so that coaches can accurately dose the load and find the most suitable training methodology.

Materials and Methods

This is a theoretical study, literature review. Scientific articles were viewed from the following databases: PubMed, Europe PMC, Scopus and the articles were viewed from the following scientific journals: The Journal of Strength and Conditioning Research (JSCR), American Journal of Neuroradiology, Children, British journal of sports medicine, International Journal of Sports Science & Coaching, Medicine & science in sports & exercise, Journal of Adolescent Health, International Journal of Environmental Research and Public Health, Clinical endocrinology, Journal of International Dental and Medical Research, Acta Paediatrics, Journal of Sports Medicine and Physical Fitness.

Articles in English and Latvian were analysed. In Latvian, only two sources were analysed – guidelines for strength and conditioning training process in youth sports in Latvia and Regulation No. 594 of the Cabinet of Ministers “*Procedures for Health Care and Medical Surveillance of Athletes and Children with Increased Physical Load*”, the rest of the sources were scientific publications in English. The following topics included: puberty, the stage of sexual maturity in sports and methods for determining the stage of sexual maturity.

We analysed only those publications that had full online access. Studies describe the methods applied to athletes, adapted to sports. The oldest source used in our literature review is the 2002-year publication, the latest – the 2023-year publication.

The following keywords were used in the search: Stage of sexual maturity in sport, methods for assessing puberty, puberty in youth sport, maturity stages in sport.

During the study, an analysis of various methods for determining the stage of sexual maturity were descriptively carried out, as well as a transparent comparator was created in the form of a table with the methods found in the scientific literature. In this review paper are reviewed and analysed 27 sources. Below (see Figure 1) is a schematic representation of how the selection of literary sources was carried out, as well as a schematic representation of the theoretical study.

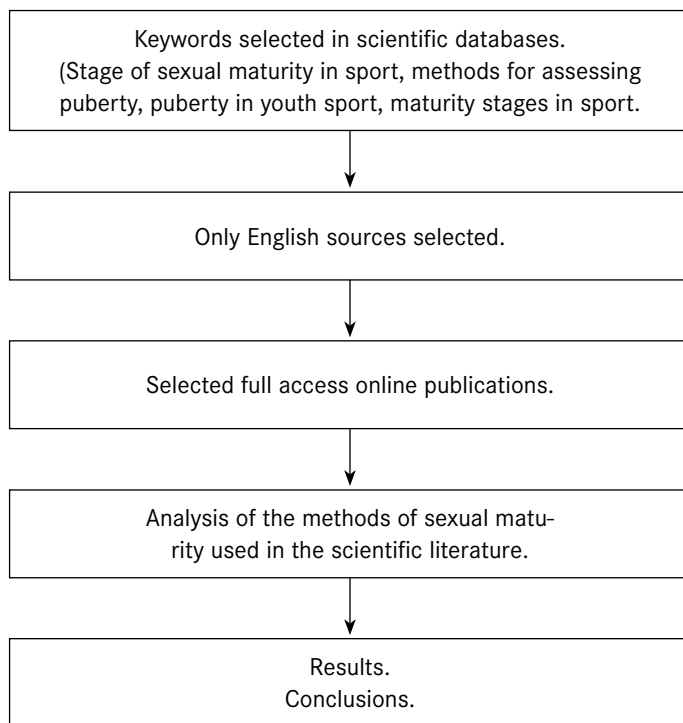


Figure 1. Schematic picture of the review paper.

Results

In the first part of results section, we analysed the methods of sexual maturity, compared them, and determined the pros and cons of each method. The summary was made of the main information from each researched method in the literature analysis. In general, somatic, skeletal, and sexual methods were covered in this literature review. In the second part, we created a model that could be used in practical research in the future. As well as based on the analysis of literary sources and materials, we offer a solution on how to determine the stage of sexual maturity in adolescents practically the most convenient way.

The Tanner Criteria

The Tanner scale was recognized for many years as one of the best ways to determine stage of sexual maturity, however, it must be recognized that nowadays it could be unethical to use a secondary sex mark assessment scale in the practice of coaches today (Emmanuel, Bokor, 2017). On the Tanner scale, 5 classification stages for boys and girls are used (Emmanuel, Bokor, 2017). After the assessment of external sex characteristics, which is expressed by the parameters of the hair and external genitals, the stage of sexual maturity is evaluated (Emmanuel, Bokor, 2017). Referring to the authors' publications, we estimate that this method could nowadays be used as a self-reporting questionnaire and,

if possible, as a method of comparison with some other method (Koopman-Verhoeff, et al, 2020). Earlier studies suggested that the Tanner scale was a reliable enough measure to assess the degree of puberty using self-reporting questionnaires, (Leone, Comtois, 2007), however, self-reporting questionnaires have a subjective meaning.

Somatic Assessments

Predicting Peak Height Velocity (PHV) is method used in long-term research which consisting of various anthropometric measurements (Mirwald, et al, 2002). The collective of authors began to include in the method such anthropometric data as the length of the legs in sitting and standing positions (Mirwald, et al, 2002). Other studies use body circumferences on one side of the body for limbs (Cselkó, et al, 2021). The authors note that anthropometric measurement data in adolescents correlates with body circumference data and muscle mass and knowing this, coaches can use anthropometric measurement data to elucidate puberty stages (Cossio Bolaños, et al, 2019). Obtaining body circumferences and other anthropometric measurements would be the most basic method for a coach to predict PHV, but still necessary to understand that testing must take place in the long-term and prediction methods are not always as accurate as laboratory methods.

X-ray

The X-ray method is often referred to in science as the “golden standard” for determining the stage of maturity. There are several X-ray methods: Tanner-Whitehouse method, Greulich-Pyle, Fels method, where radiologists see the growth zones and their structural state (Lloyd, et al, 2014). The X-ray method accurately provides data on the structure of skeletal tissues, however, there are several limiting factors affecting the use of X-rays in studies, for example, a radiologist is needed to analyse the data obtained, X-ray adverse radiation (Lloyd, et al, 2014). We believe that this method would also not be suitable for large groups of participants, due to the availability of resources, for the future research process for coaches. Although X-ray radiation is minimal today, the ethical aspects of this method exist.

Methods of visual diagnostics – Ultrasonography (USG)

Scientists comparing different methods mention that ultrasonography has great advantages due to ethical and practical applications (Rüeger, et al, 2022). Now, the USG is not considered to be one of the main methods of determining the stage of sexual maturity in science.

However, there are studies that prove that there are no significant differences when comparing the data provided by X-rays and USG, which suggests that in the future it is possible to replace X-ray examinations by excluding the ethical aspects of radiation with the USG method to determine the stage of sexual maturity in adolescence (Torenek Ağırman, Bilge, Miloğlu, 2018).

Methods of visual diagnostics – Magnetic resonance (MRI)

Studies conducted with magnetic resonance imaging show that the closure of the growth plate is not affected by practicing sports (Kvist, et al, 2021). For the magnetic resonance method, the main limitations are the cost and lack of resources to conduct long-term testing. When performing data extraction by the magnetic resonance method, the authors note that this procedure takes about 15 minutes per athlete and the biggest benefit is the accuracy

of the data and the avoidance of X-ray radiation. (Leyhr, et al, 2023). The authors reveal that MRI images have shown that growth plate in boys close 2 years later than girls, and this method can also be used as an alternative solution for X-rays (Kvist, et al, 2021).

Laboratory tests – hormonal blood test

The level of maturity in sports is important, especially at different ages it can be observed both physiologically, hormonally, and physically by performing motor actions (de Almeida-Neto, et al, 2020). During puberty, hormonal changes play a huge role in the development of an athlete, when rapid maturation of the body occurs, which is facilitated by an increase in the steroid hormones of the estrogens (Cole, et al, 2015). Hormones of this group also affect the onset of menstruation in women, which also determines the stage of sexual maturity (Cole, et al, 2015). Studies confirm that growth hormone reaches peak level precisely during puberty (Malina, et al, 2015). When conducting research with female athletes, research papers are analysed predominantly blood test markers for estrogen group hormones, more specifically, estrone, estradiol, estriol, and androstenedione (de Almeida-Neto, et al, 2020). Research has shown that the levels of testosterone, estradiol and progesterone in both girls and boys vary in stages of puberty, which makes it possible to determine the stage of sexual maturity more accurately in youth sports (Kazemi, et al 2014). Blood tests are not very expensive nowadays, so we propose to include hormonal testing in the annual health check-up of athletes directly at the age of puberty, but we understand that this is not a typically available method that coaches can easily use in their daily work.

Laboratory tests – saliva tests

Studies prove that the puberty phase, especially before and after growth spurts, can be detected by saliva tests. (Wijaya, et al, 2019). When choosing saliva tests, assessing the level of free testosterone at different stages of puberty, the researchers mainly emphasize the importance of using non-invasive methods in youth sports (Hibberd, et al, 2015). Saliva tests in laboratory conditions are not difficult to perform, a specialist is not required to collect samples, but specialists with knowledge in the use of laboratory technologies should be attracted to carry out analyses. In our opinion, the results could be more accurate if blood tests were used, including them in the annual athletes' assessment.

In the overview of results, a table "Comparison of methods for determining the stage of sexual maturity" has been created with a transparent comparison for each of the methods (see Table 1).

Explanation of the table:

Table 1 shows a comparison of each of the methods considered in the literature.

The first column shows authors who have used methods for determining the stage of sexual maturity in adolescents in studies.

The second column shows the classification of the method.

The third column describes the advantages of each method based on scientific literature.

The fourth column describes the limiting factors of each method in the studies.

Table 1

**Comparison of methods for determining
the stage of sexual maturity**

Authors	Method	Advantages of the method	Limitations
Emmanuel, Bokor, 2017. Koopman-Verhoeff, et al, 2020.	Tanner Criteria (Tanner scale)	Simple methodology. There are options for creating a self-reporting questionnaire.	Only trained clinicians are qualified to assess sexual maturation by Tanner Criteria. Consent of the parent and child. Accuracy of self-reporting questionnaires.
Mirwald, et al, 2002. Cselkó, et al, 2021.	Somatic Assessments – Predicting Peak Height Velocity (PHV) Somatic Assessments – Anthropometric measurements	Methodology available to coaches. Can be followed to parameters in the long-term.	Not so accurate method. Longitudinal anthropometric assessment – time-consuming method.
de Almeida-Neto, et al 2022.	X-ray	It is possible to accurately determine the growth zones. The younger the athlete, the easier the differences can be observed.	X-ray radiation. Costs. Specialist required – radiologist.
Rüeger, et al, 2022.	Methods of visual diagnostics – USG	The exact method to determine the growth zones and their difference at different age stages. Harmless method. Non-invasive method.	High cost. Need a specialist who works with the ultrasound examination method.
Leyhr, et al, 2020.	Methods of visual diagnostics – MRI	Accurate analysis of soft and hard skeletal structures.	High cost. Specialist required.
Kazemi, et al 2014.	Laboratory tests – hormonal blood test	The most accurate and direct testing method for hormone determinants. Relatively small costs.	With many participants – it is difficult to plan a test procedure. Specialist required.
Hibberd, et al, 2015.	Laboratory tests – saliva tests	Non-invasive method.	Cost of laboratory tests. Female athletes in studies have been offered blood tests to measure hormonal levels.

After the analysis of scientific sources carried out based on research, we have developed recommendations for youth coaches on how to include the determination of the stage of sexual maturity in the regular assessment of athletes during puberty. The model we created shows in Figure 2. It would be valuable to include in the regular health check-up of athletes the determination of the stage of puberty, this would give coaches information in the future to plan the intensity and amount of workload in the training process.

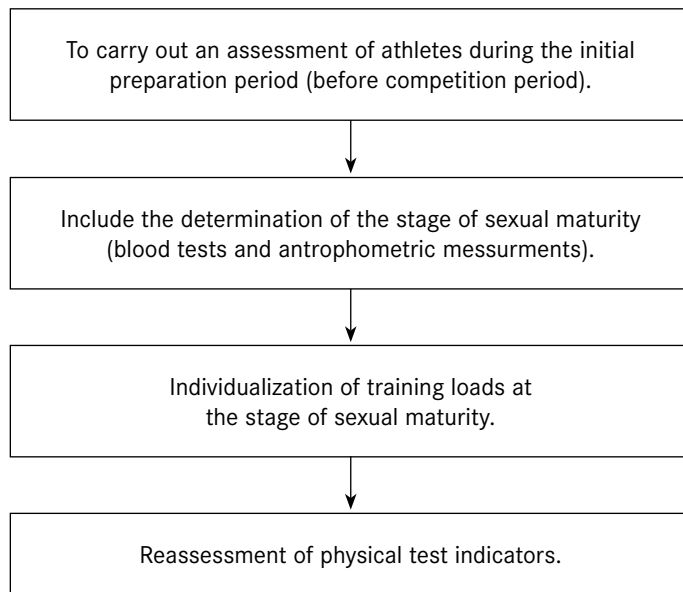


Figure 2. **How to include an assessment of the stage of sexual maturity in the process of long-term training in youth sport?**

Currently, in Latvia, in youth sports, annual health examinations are performed with a complete blood count (CBC), urinalysis, eyesight test, electrocardiogram (ECG) and assessment of physical parameters according to the Eurofit method (Ministru kabineta noteikumi Nr. 594, 2016), but determination of the stage of sexual maturity does not occur. For future research, it would be important to introduce into the regular examination of athletes one of the methods for determining the stage of maturation, as well as the analysis of the literature carried out will allow for the further formation of practical research.

Discussion

The purpose of this literature review was 1) to find out and compare different methods for determining the stages of sexual maturity, 2) adapt a method that can be applied in the training process for determining sexual maturity that can be easily practically applied to coaches to create appropriate, individualized training content and methodology for adolescent athletes.

Limitations for the first part of review paper was find methods that are used only for athletes in puberty period. Publications in healthcare and medicine on puberty levels are numerous, but it was difficult to find publications where there is an explanation of the purpose of using the data obtained for the further development of athletes. Limitations for the second part of review paper was lack of practical experience of the moment, therefore, the analysis of the scientific literature in the future will be useful material for choosing appropriate methods for determining the stage of sexual maturity in youth sports.

In sports, the stage of sexual maturity is tangled with cognitive and physical abilities (Rüeger et al. 2022). Several studies prove that earlier-mature athletes are physically stronger, faster, more technically accurate, and this creates a big difference in team players or athletes within the same training group (Guimarães et al. 2019), therefore, in our opinion, it is not necessary to conduct all training in your chronological age group, but during training the coach should correctly dose the load for each athlete according to sexual maturity stage. It is possible to make practice with the same training methods but different repetitions and intensities to individualize the load. In our opinion, there is a problem in youth sports, especially in team sports, because if a late-mature athlete spends all the training with a load that is expected for an early mature athlete, then there will be a higher risk of injury, a risk of overload, and psychological pressure also.

The stage of sexual maturity plays an important role in youth sports, not only in physical indicators and cognitive skills, but also in the selection of talent. It is impossible for coaches to choose one of the most accurate and affordable method, but we believe that by identifying regular (at least once a year) changes in hormonal levels and comparing them with anthropometric data, it would also be easier for coaches to select the most talented athletes by determining whether an athlete's development is faster or slower than average. There is an assumption that by identifying the most talented athletes at an early age, coaches begin an early specialization in their practice (Till & Baker, 2020). Lloyd et al. admit in their publication that at the age of puberty, measurements would be valuable once every 3 months to avoid injury, as well as coaches could dose the load according to the athlete's performance in the long term (2014). We agree with the authors that in youth sport also it would be necessary to develop test batteries to track the growth of youth athletes in the long-term, but now this practice is only for athletes who are at the high level in national teams.

Studies show that muscle mass also correlates with puberty levels (Cossio Bolaños et al. 2019), therefore, it can be concluded that not only anthropometric measurements of body height and weight but also including measurements of body circumference, as well as evaluating indicators with physical tests, it is possible to monitor young athletes in the long term without using invasive methods, however, to compare these parameters with laboratory measurements, it is possible to get more high-value and reliable data.

Early specialization in youth sports can have serious consequences for the further growth of athletes (Mostafavifar, Best, Myer, 2013), however, with proper testing of sexual maturity, it is possible to dose the load according to biological age, therefore, it can help the growth of athletes by training in intensity at their biological maturity but achieving the best possible result. It is known that at different ages there were windows of opportunities

to develop some of the physical characteristics, so researchers have developed a long-term development model for coaches in which the load is dosed according to age, each of the physical characteristics (Lloyd & Oliver, 2012). The researchers have developed a long-term development model for athletes in the training process in puberty, however, we see that this model does not include athletes whose biological maturity is faster or slower than average, therefore, in the future, especially for representatives of team sports, where there are different stages of sexual maturity in the same training group, it is very important to assess the stage of sexual maturity in order to create an individualized training program for each athlete.

Currently, in Latvia, Latvian basketball association uses physical training guidelines in children's and youth sports, but these guidelines do not provide for testing of sexual maturity. The guidelines offered to Latvian youth athletes include samples of training plans by age stages, tests and testing procedures are also indicated (Ernšteins & Ikstens, 2022), however, it would be more important for coaches to have training plans for the age group corresponding to the biological age rather than the age group corresponding to the chronological age, so we believe that the implementation of the long-term training model has been started in Latvia, however it needs to be improved. Analysing the guidelines mentioned above, the authors offer training plans according to age stages, in which exercises are included at different levels of complexity (Ernšteins & Ikstens, 2022), however, we believe that it would be difficult for coaches, especially in team sports, to conduct a workout by offering everyone different exercises, so in group training it is more important to pay attention to intensity and volume by individualizing it rather than adjusting the exercises.

Conclusions

After analysing literary sources, we found out that there are several methods for determining the sexual maturity of athletes, however, none of the methods today can be recognized as the "gold standard" without limitations.

Coaches mostly use anthropometric assessment methods than other diagnostic methods, however, we recommend combining anthropometric measurements with laboratory tests, including hormonal blood tests in the annual youth athletes screening. This type of system could facilitate the work of coaches in the future by planning the load and content of training according to different stages of sexual maturity of athletes.

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Types of Parental Support Systems in Youth Sports: a Literature Review and Future Perspectives

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Abstract

The participation of youth in sports is pivotal for their holistic development, influencing physical health, mental well-being, and social skills. Parents play an indispensable role in this process by providing the necessary financial resources and emotional backing. Their involvement ensures that young people could engage in sports. The aim of the research is to comparatively analyse different parental support systems in youth sport and to establish aims of future research. Research methods: analysis of scientific articles (electronic scientific databases Web of Science Core Collection, Scopus), search keywords – “sport*” OR “youth-sport*” OR “young athlete*” AND “support*” OR “psychological need*” AND “family *” OR “parent*” OR “father*” OR “mother*”. The period covered by the research is from 1990 to 2022 and abstracts, conference proceedings, dissertations, book chapters, and articles published in non-peer-reviewed journals were excluded from the search. Main results of the research: the role of parents is considered very important in the athletic development of children and youth, providing emotional, financial, and social support. The research demonstrates that inadequate support from the state/community, coaches and society can hamper parents’ ability to effectively support their children and youth in sports.

Keywords: parental support, youth sport, parental support system

Introduction

The importance of sport in the lives of youth is indisputable, and it provides a significant contribution to their psychosocial development. The role of parents in this process is crucial, as the importance of both financial and emotional support is often emphasized,

since it ensures that young people have the opportunity to participate in sports activities and develop their physical abilities (Kromerova, 2017; Dorsch et al., 2017; Dorsch et al., 2016; Coakley, 2006). Parental support has been defined as shaping their children's (Kovács et al., 2022) sports careers. When supporting their child-athlete, parents typically offer six distinct forms of assistance: emotional support, financial assistance, organizational aid, practical help, reflective guidance, and technical expertise (McIlmoyle et al., 2024). Research, such as the analysis by Kolayış, Sari and Çelik (2017), highlight the motivational climate (Harwood et al., 2019; Dweck, 1986; Gagné, 2003) created by parents as an essential factor contributing to the development of youth's self-determined motivation in sport.

According to the Achievement Goal Theory (AGT) and the Self-Determination Theory (SDT), parental behaviour and the influence of the created microclimate on the athletic growth of youth are spotlighted as fundamentally important. AGT emphasizes that having significant persons in young people's lives can influence their needs, expectations, and rewards, fostering a mastery orientation and promoting pro-social behaviour and moral judgement (Kromerova, 2017). In turn, SDT focuses on natural, innate psychological needs – relatedness, competence and autonomy – which, when satisfied, contribute to turning extrinsic motivation into intrinsic motivation (Deci & Ryan, 1985; Kromerova, 2017).

Furthermore, research also point out the importance of a parent-initiated motivational climate, finding that the perceived learning and enjoyment climate, as well as the worry-conducive climate and the success-without-effort climate that youth perceive from both parents are significantly related to their level of self-determined motivation (Kolayış et al., 2017). It is also emphasized that parental participation and support not only provide youth with material and practical help, but also emotional and psychological support, which is fundamentally important to promote youth involvement in sports and encourage their motivation.

Based on AGT and SDT, it is clear that the motivational climate and support created by parents are crucial in building and maintaining young people's self-determined motivation in sports. The positive involvement of parents, which promotes mastery orientation and supports autonomy, can significantly influence the psychosocial well-being of youth, and encourage a positive attitude towards sports. Future research would be valuable in deepening the understanding of optimal forms of parental involvement that support youth engagement and development through sport.

Parental support in youth sports can be conceptualized using a variety of psychological theories, but an overarching understanding is often drawn from the Bronfenbrenner's Ecological Systems Theory (1979). This theoretical framework provides a nuanced view of how parental support functions within the wider context of child development in sport. This theory is applied as follows:

Parental support in youth sports refers to parental behaviours and actions that promote children's development, enjoyment, and participation in sports activities. This support can be emotional, informational, logistical, or tangible, and it plays a significant role in influencing a child's sporting experience and development.

Bronfenbrenner's theory (1979) believes that human development is influenced by different types of environmental systems that interact with each other. These systems range

from the immediate surroundings such as family and school (a microsystem) to the wider societal and cultural context (a macrosystem). Application of parental support in youth sports:

The microsystem: This level includes the immediate environments with which the child interacts, for example, home and sports teams. Parental support in this context includes direct participation in children's sports activities by providing transport, attending competitions and games, providing support and feedback on performance.

The mesosystem: Interactions between various microsystems, for instance, communication between parents and coaches, or between parents and sports organizations. An effective parental support in these environments ensures a child's athletic experience by guaranteeing consistency and positive support across contexts.

The exosystem: Includes settings that indirectly affect a child, for example, parents' workplaces or the sports policy of the community. Parental support here may include advocating for youth sports programmes or balancing work responsibilities to encourage children's participation in sport.

The macrosystem: The wider cultural, societal, and economic influences that shape attitudes and ideologies regarding sports. Parental support at this level can include challenging stereotypes, promoting positive sport values, and supporting inclusive and equal access to sport for all children.

The role of parental support: it promotes participation and enjoyment, reduces competitive anxiety, and helps children cope with success and failure in sport (Bonavolontà et al., 2021). It also provides necessary resources, for example, equipment and opportunities to participate in sports activities. Furthermore, it incorporates guiding children in their athletic development, including skill advancement, sportsmanship awareness, and personal growth.

When viewed through the lens of the Ecological Systems Theory (1979), the parental support in youth sports is a multifaceted and dynamic process that includes various levels of influence, from direct family interactions to broader societal norms. Effective parental support is characterized by active, positive involvement in children's sport experiences, as well as being adapted to the child's needs, and aware of the wider ecological context in which these sporting activities take place. This comprehensive approach ensures that children get the most out of their participation in sport, promoting their physical, psychological, and social development. The purpose of this research is to comparatively analyze different parental support systems in youth sport and to establish aims of future research.

Materials and methods

The literature search was performed in four internationally recognized databases: Web of Science, Scopus. These databases have gained academic credibility and have been used in previous systematic reviews of sport and sport psychology. The literature search was conducted in 2023 and 2024. Abstracts, conference proceedings, dissertations, book chapters, and articles published in non-peer-reviewed journals were excluded from the search. The period covered by the research is from 1990 to 2022. The search level for each database included the title, abstract, and keywords.

The following combination of keywords and Boolean operators was formulated: “sport*” OR “youth-sport*” OR “young athlete*” AND “support*” OR “psychological need*” AND “family*” OR “parent*” OR “father*” OR “mother*”.

Inclusion/exclusion criteria

The question raised in this study is related to the forms/types of parental involvement in youth sports. Therefore, the eligibility criteria include the following: (a) the type of parental support in youth sports (yes/no b) sports teams; c) the study should use quantitative, qualitative or mixed methods (not reviews) and should be able to provide information on the form/type of parental involvement. The subjects of this review are young athletes, while the included studies should mainly involve adolescent athletes (aged 10–16) to highlight the involvement of parents in young athletes’ adolescence.

Upon obtaining literature during the initial search, duplicates were identified, and selection was made based on titles and abstracts. Next, the full texts of the remaining studies were retrieved and assessed for eligibility. The initial search yielded 48507 published articles, and 4156 articles remained after duplicates were removed. Of the remaining 4156 works 4146 were further excluded due to unavailability of full text. As a result, 10 articles were included in this review.

Results

This study of literature review analysed various types of parental support provided to children and youth involved in sports. The types of support were classified into three main groups: emotional, financial, and social. Each category is detailed below with specific examples from the literature review (see Table 1).

The emotional support of parents is essential to promote a positive sports experience for children and youth. This includes encouragement, moral support, and psychological help. For example, Mwanga et al. (2017) stressed that parents provide encouragement and moral support to Kenyan athletes, thus significantly influencing their performance. Similarly, Knight et al. (2015) highlighted the need to manage pressure and provide positive emotional support in order to prevent burnout in children and youth sports. In the reviewed studies, emotional support was consistently recognized as an important factor in promoting children and youth’s motivation and involvement in sport.

Although less mentioned, financial support still plays a vital role in providing children and young people with the opportunity to participate in sports. This support includes covering expenses for sports equipment, training, and competitions. For instance, Dunn et al. (2016) discussed how a higher financial investment from the family in children and youth sport may increase the perceived parental pressure, which could reduce children and youth’s enjoyment and commitment. Furthermore, in the study by Mwanga et al. (2017), parents provided financial support for essential needs such as equipment and training, highlighting the financial challenges faced by families in supporting young athletes.

Table 1

Content of the Parental Support

Authors/ Year	Title	Main conclusion	Emotional Support	Financial Support	Social Support
Mwanga et al., (2017)	Family and its Influence on Kenyan Athletes' Performance: The Role of Social Environment	Parental love, involvement, and participation in sports play a critical role in introducing children to and fostering their engagement in sports, often leading them to follow similar career trajectories. Parents can sometimes play a role in the decline and eventual exit of athletes from their sports careers.	Parents provide encouragement, moral, spiritual support, and psychological support.	Parents provide financial support for equipment, training, food, and rent.	Parents act as role models, instill discipline, and provide community support.
DiSanti et al., (2021)	Exploring Parent-Athlete Dyads' Perceptions of Sports Specialization and Sport Experiences	Parents and athletes generally possess similar attitudes towards sport specialization; athletes may perceive their sport experience as more specialized and demanding than parents.	Parents offer psychological support and encouragement.	Not explicitly mentioned.	Parents understand athletes' experiences and maintain open communication.
Harwood and Knight, (2015)	Parenting in Youth Sport: A Position Paper on Parenting Expertise	Effective parental involvement enhances children's sport experience; balancing support and pressure is crucial.	Parents provide emotional feedback, warmth, and responsiveness.	High financial and time demands placed on parents.	Parents support at competitions and maintain high-quality parent-child relationships.
Knight et al., (2017).	Parenting in Sport	Parental involvement in sports is a complex dynamic, with diverse consequences, varied motivations for different types of participation, and the necessity for multifaceted strategies to provide adequate support. Parental support is vital but must be balanced to avoid inducing stress and burnout.	Parents manage pressure and provide positive emotional support.	There is a connection between the financial investment parents put into their children's sports and the resulting feelings of pressure, enjoyment, and commitment to the sport.	Sport parenting is a complex social experience (for example a need to protect their children from harm), influenced by a whole host of factors and variables.

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Table 1 (continued)

Authors/ Year	Title	Main conclusion	Emotional Support	Financial Support	Social Support
Ullrich-French and Smith, (2006)	Perceptions of Relationships with Parents and Peers in Youth Sport: Independent and Combined Prediction of Motivational Outcomes	Parents significantly influence children's motivation and involvement in sports.	Parents provide motivation and emotional support.	Not explicitly mentioned.	Parents and peers offer social integration and enhance self-worth.
Holt et al., (2008)	Parental involvement in competitive youth sport settings	Parental involvement varies and is influenced by multiple factors including individual and environmental influences.	Parents offer emotional involvement and encouragement.	Not explicitly mentioned.	Parental involvement at competitions and various environmental influences.
Gould et al., (2002)	Psychological Characteristics and Their Development in Olympic Champions.	Parental support is crucial for developing psychological characteristics essential for Olympic success.	Parents help manage expectations and provide psychological support.	Not explicitly mentioned.	Family provides social and emotional support, helping develop psychological traits.
Dunn et al., (2016)	The Impact of Family Financial Investment on Perceived Parent Pressure and Child Enjoyment and Commitment in Organized Youth Sport	Higher family financial investment in sports can increase perceived parental pressure, which may reduce children's enjoyment and commitment to sports.	Parents provide encouragement despite high financial investments.	High financial investment in youth sports, covering costs such as equipment and training.	Community and peer support helps manage stress and expectations from financial investments.
Turman, (2007)	Parental Sport Involvement: Parental Influence to Encourage Young Athlete Continued Sport Participation	Parental support and pressure play significant roles in youth sport participation; the type and amount of support or pressure can influence children's enjoyment, anxiety, and retention in sports.	Mothers' support increases athlete enjoyment more than fathers' support.	Not explicitly mentioned.	Parental involvement fosters children's athletic involvement; both male and female parents contribute to children's sport participation.
Côté, (1999)	The Influence of the Family in the Development of Talent in Sport	Family support through different stages is essential for talent development.	Parents support athletes through different stages of development.	Parents make a financial and time commitment to their child athlete.	Family support through different developmental stages.

Social support includes parental participation in competitions, promotion of a sense of belonging, and improvement of the social integration of athletes. Holt et al. (2008) noted that parental participation in competitions and other sporting events has a positive effect on children and youth's sport experience. In addition, Côté (1999) emphasized the importance of family support at different stages of talent development. This social support not only contributes to the development of psychological characteristics, but also strengthens the relationship between parents and children, contributing to their overall well-being and success.

Discussion

All authors in this research as in similar research (Dunn & Tamminen, 2022; Hurtel & Lacassagne, 2011; Rodis, 2013; Rowland, 2007; Taylor & Collins, 2015) agree on the critical role of emotional support provided by parents in fostering athletes' motivation, resilience, and performance: Mwanga et al. (2017) emphasize encouragement and psychological support, Harwood and Knight (2015) highlight warmth and responsiveness, Gould et al. (2002) and Ullrich-French and Smith (2006) stress emotional support as essential for motivational and psychological outcomes. Knight et al. (2017) and Dunn et al. (2016) examine the negative consequences of excessive involvement, such as stress or burnout. In contrast, studies like Mwanga et al. (2017) concentrate more on positive contributions without deeper criticism. Parental support in sports is multifaceted, with overlapping yet distinct focus areas across studies. Understanding and optimizing parental support systems is essential for fostering positive youth sports experiences and development. This analysis highlights the multifaceted nature of parental involvement in youth sports and promotes areas for further exploration to enhance athlete experiences and outcomes: examine how cultural and socio-economic factors influence parental roles in youth sports across the team and individual sports; find out strategies for balancing support and avoiding burnout (parent-education programs); investigate long-term impacts of parental involvement at different athletes developmental stages; explore the influence of technology on parent-athlete interactions in parental support.

Conclusions

A summary of key findings from the articles on parental support in youth sport:

1. The role of parents is considered very important in the athletic development of children and youth, providing emotional, financial, and social support.
2. The emotional support provided by parents acts as motivation and encouragement, which significantly affects the sport experience and achievements of children and youth.
3. Parents invest significant financial resources in children and youth sport activities by paying for training, equipment, and competitions.
4. Social support, such as parents' participation in competitions, provides transport and creates a positive environment for the development of children and youth.

Main issues and limitations:

1. Excessive parental pressure can cause stress, reduce children and youth's enjoyment of sports, and contribute to their burnout.
2. Parents feel the financial burden associated with children and youth sports activities, which can put a lot of pressure on both parents and children/youth.
3. Inadequate support from the state/community, coaches and society can hamper parents' ability to effectively support their children and youth in sports.

Aims and objectives of future research:

1. To investigate what is the optimal level of parental support to promote positive sport experiences and achievements of children and youth without excessive stress and pressure.
2. To explore and improve the state/community/club and coaching support systems in order to promote a positive sport environment for children and youth and ease the burden on parents.
3. To conduct an empirical study and analyse the effectiveness and impact of different types of parental support on children and youth's athletic development and emotional well-being.
4. To develop and distribute educational materials for parents on effective support without excessive pressure and stress in order to promote a positive attitude of children and youth towards sports.
5. To promote cooperation and communication between parents and coaches to ensure coordinated and effective support for children and youth in sports.

These aims and objectives will help to create a more balanced and supportive environment for the development of children and youth sports, ensuring that they get the most out of sports activities without undue pressure and stress.

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