

# A Multidimensional Conceptual Framework for Sport Talent Identification and Development in Early Childhood: A Systematic Review

Juriana Juriana, Muhamad Syarif Sumantri\*, Dede Rahmat Hidayat

Department of Early Childhood Education, Universitas Negeri Jakarta, Indonesia

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**Abstract** The identification and development of sports talent in early childhood should focus more on development rather than simply identifying talent. This study provides a systematic analysis of various research articles published between 2017 and 2021 related to the identification and development of sports talent in early childhood. This research is an active response to the first socialization of the "AYO OLAHRAGA" Movement by the Ministry of Youth and Sports and the "Gerakan Hidup Masyarakat Sehat" (Geramas) developed by the Ministry of Health of the Republic of Indonesia in 2017. International databases such as Google Scholar, Tandfonline, Scindirect, and Proquest, totalling 1759 articles were used in the initial literature search with a final 11 articles chosen according to the research objectives. The articles were analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach which consisted of 3 (three) steps, reading the article, extracting the contents of the article, and analyzing and drawing conclusions. The 11 selected articles revealed that the process of identification and the development of sports talent in early childhood cannot be treated separately. 73% of the articles stated that the identification of early childhood sports talent needed to measure children's physical aspects, especially their fundamental motor skills (FMS). In addition to the measurement of physical aspects, it is also considered necessary to include psychological (36%) and sociological aspects (27%) of development.

This empirical evidence analyzed in this document can become the conceptual basis for developing further research on the identification and development of multidimensional sports talent in early childhood.

**Keywords** Early Childhood, Multidimensional Conceptual, Sport Talent

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## 1. Introduction

The identification of sports talent is a non-linear and multidimensional process, necessitating the involvement of various aspects of development. Identifying children's sports talent from an early age is important for understanding their initial competencies and for developing prospective future athletes.

Potential talent that affects individual motivation, behavior, and performance [1] can be identified early. Talent enables people to achieve advantages in a particular field [2]. Some experts define talent as a quality that is identified at an early age; a specialty that can predict future privileges, and an extraordinary skill that is systematically develop. Talent represents a relationship between an individual and the environment [3].

In sport science, the concept of 'talent' was introduced

by Howe in 1998. According to Howe, talent has five characteristics that are either genetic or innate, stipulate future success, show individual excellence, are present in a small population, and are domain-specific skills [4]. Experts hold differing views on the first four characteristics which narrows the definition of talent. However, they agree with the idea that talent is a domain-specific skill [5].

Identifying athletic talent from an early age has been popular for a decade [1], [6], [7]. However, research on talent is complex, challenging, risky, it takes time, and is often problematic [4],[6],[7]. Talent identification also raises dilemmas, mainly for children and adolescents [4]. If sports talent is identified from an early age, it is as if it is closed to the identification of other talents. Meanwhile, if sports talent is missed or not identified from an early age, then there is no support from the start from the environment. Contradictory talent identification at an early age is essential to ensure a supportive environment is provided for talent development [9], [10]. Identification implies an investment of resources to support the process [11], [12], as well as efficient and effective sport coaching management in the future. In the Long-Term Athletes Development, sports coaching, known as Active Start, may commence from 0 to six 6 years old, [13]-[15].

Research on sport talent identification is related to genetic testing [16] where several studies show specific genes for speed that only apply to certain ethnicities [17], [18]. Single Nucleotide Polymorphism (SNP) and other genetic variants directly or indirectly affect sport performance. However, genetic testing for sports talent identification should be combined with other tests or tools [19], [20].

A person with a sporting talent usually displays specific physical characteristics. Outstanding athletes demonstrate physical, physiological, and anthropometric aspects [19] [21]. The physical element consists of motor competence and skills. Motor competence is the successful performance as a senior or elite athlete [6]. Fundamental motor skills (FMS) can identify children who will potentially succeed or not succeed in sports [22].

The identification of sport talent is multidimensional, covering various aspects from physiological-biomechanical to developmental sport-psychology. Cognitive perception is also discussed within the psychological aspect. The physical aspect, identifies talented athletes, including how ambitious they are. Other psychological aspects identified are mental toughness, positive attitude, maturity, desire, competitiveness, and personality [9] [23].

Sport talent identification leads to the talent being developed which is connected to individual's interaction with the environment. [5], [9]. Family support, teammates and coaching are also essential in identifying talent [24]-[27]. Physical, physiological, psychological, and sociological predictor models are all used to identify various aspects of talent [28].

## 2. Objectives

To understand sport talent identification, it is important to note that identification is applied separately to development. It is also essential to identify suitable theories for talent identification and development in sports for early childhood. Therefore, this study aims to determine what multidimensional conceptual framework of talent identification and development in sports is most suitable for early childhood.

## 3. Methods

A literature review of databases was conducted using keywords in English such as *sport talent*, *identification*, and *early childhood* to identify how sport talent for early childhood education was measured. The use of a combination of English keywords, as on Table 1, was aimed at identifying articles written by international researchers and published in international journals and/or journals in English.

**Table 1.** Combination of keywords in article search

Sport talent AND	identification OR evaluation OR test OR prediction AND early childhood OR pupils OR kindergarten OR preschooler
Sport giftedness AND	identification OR evaluation OR test OR prediction AND early childhood OR pupils OR kindergarten OR preschooler
Sport potential AND	identification OR evaluation OR test OR prediction AND early childhood OR pupils OR kindergarten OR preschooler

Three main criteria were used in selecting articles. First, the article was published within the last 5 years (2017-2021). These years are related to the first socialization of the "AYO OLAHRAGA" Movement by the Ministry of Youth and Sports and "Gerakan Masyarakat Hidup Sehat" (Germas) by the Ministry of Health of the Republic of Indonesia released in 2017. These two community movements open great opportunities to develop sports from an early age in Indonesia. Second, the research participants were in the early childhood range of 0-8 years. And third, only articles that were directly related to the process of identifying sports talent were selected. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were used to select articles for review. The guidelines use a 5-step process consisting of; 1) defining topics and criteria, 2) determining sources of information, 3) selecting relevant literature, 4) collecting articles and 5) analyzing articles [7]. The flow of article selection according to the PRISMA steps is described in diagram 1.

The literature review search revealed 1759 articles from four databases as follows: Google Scholar (995 articles), Tandfonline (220 articles), Science Direct (57 articles), and ProQuest (487 articles). The articles were stored in Endnote

and checked for duplication of data. The results of this examination showed 64 duplicate articles, leaving 1695 articles. After reading the titles, 1561 articles were eliminated because the title did not match the research objectives, leaving 134 articles. Next, the abstract was read, 123 articles were eliminated because they were not aligned with the research objectives, leaving 16 articles. 5 articles were eliminated because they were not recorded on Scimago.jr, leaving 11 articles to be analyzed further. Research participants from the various countries reported in the remaining articles were either early childhood or

older.

The articles were analyzed in three stages: 1) Reading the full articles and understanding the contents of all articles; 2) Extract the readings and summarize them in the form of a table. Table 2 presents information on the title and author, research objectives, research location, types and research methods, research samples, and research summary; 3) Analyze the similarities and differences in the content of each article and summarize the findings in categories. The results of the analysis identified the variables that are commonly used.

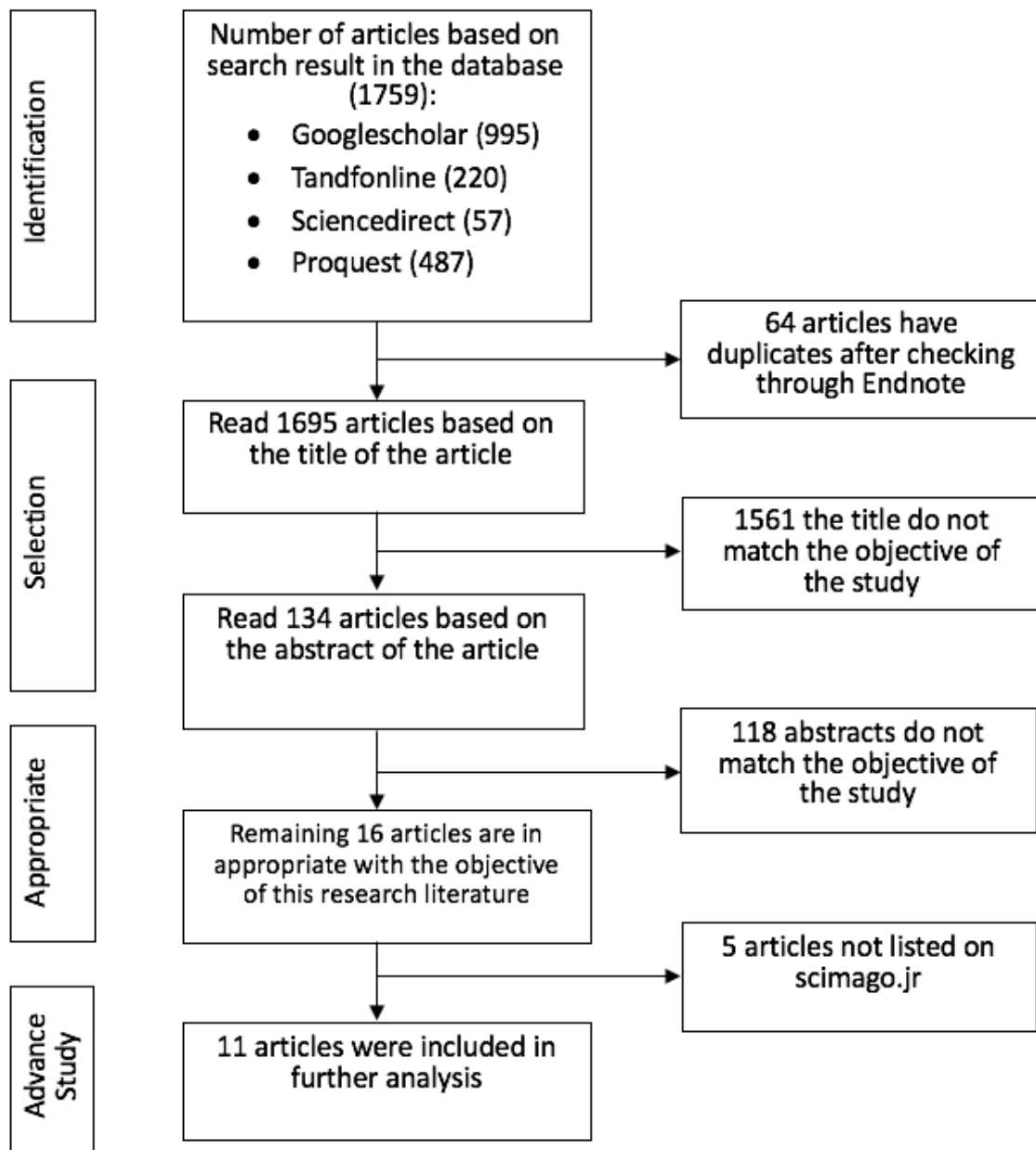


Diagram 1. PRISMA Flowchart for article selection

## 4. Results

The analysis of eleven articles related to the identification of sports talent in early childhood indicates that talent identification and talent development are closely related to each other. One article used the term TI for talent identification [28], while three articles used the term TID for talent identification [4], [6], [23]. Two articles used the term TD for talent development [23], [29] and two articles used the term TDE for talent development [4], [23]. While others did not use a specific term to represent either talent identification or talent development. Of the eleven articles, five articles explicitly mentioned the age of the sample as early childhood (0-8 years), two articles did not mention a certain age (eg under 10 years), two articles did not mention the age of the sample used in study, and one article used

coaches as a sample. One article used a sample that was not at an early age but was included because it could be applied to early childhood. Five articles or 45% were systematic literature /scoping reviews, three articles or 27.5% were cross-sectional studies, and three articles or 27.5% were quantitative studies (two experiments and one correlation).

The analysis of eleven articles related to the identification and development of sports talent in early childhood includes identification and development of sports talent through measuring physical, psychological and sociological aspects. The analysis supports the identification and development of multidimensional sports talent in accordance with the objectives of this study. A summary of findings from each article can be seen in table 2.

**Table 2.** Summary of Articles

NO	Researcher	Objectives	Place Research and Sample	Types and Methods Research	Results
1	Kathryn Johnston, Nick Wattie, Jörg Schorer, Joseph Baker (2017) Talent Identification in Sport: A Systematic Review Sports Medicine Journal. DOI 10.1007/s40279-017-0803-2 (29 October 2017)	Knowing the difference between athletes with high and low skill variables	Canada and Germany Children under 10 years and over 10 years	Systematic Review with PRISMA	There are three variables that distinguish high and low-skilled athletes, namely: psychological profile, physical profile, and previous appearance/achievement of athletes.
2	Stefanos Boutios, Giovanni Fiorilli, Andrea Buonsenso, Panagiotis Daniilidis, Marco Centorbi, Mariano Intrieri, Alessandra di Cagno (2021) The Impact of Age, Gender and Technical Experience on Three Motor Coordination Skills in Children Practicing Taekwondo International Journal of Environmental Research and Public Health Vol.18 No.5998.	Knowing the differences in age, gender, motor coordination and technical ability in children who take part in Taekwondo.  This shows the importance of planned training to develop children's talents.	Greek Children aged 5-7 years and above 5-7 years	Quantitative with Experimental	There is no difference in motor coordination between the ages of 5-7 years and older, but there are differences in technical abilities (agility and kicking ability).
3	Ivan Jukic, Katarina Prnjak, Anja Zoellner, James J. Tufano, Damir Sekulic, Sanja Salaj (2019). The Importance of Fundamental Motor Skills in Identifying Differences in Performance Levels of U10 Soccer Players. Sports Journal Volume 7 No.178	Testing the differences in basic motor skills (FMS) and specific conditioning capacity (SCC) of second tier players	Croatian Boys with an average age of 9.46 years who are members of an elite club.	Quantitative with correlation	There are no anthropometric and Specific Conditioning Capacities (SSC) differences between the Main team and the Coating team. While there are differences in motor skills between the two. Therefore, talent scouts should focus on Fundamental motor skills (FMS) rather than SCC because FMS is very relevant and forms the basis of technical skills. FMS shows the potential to identify children's talents for future success. TGMD-2 to measure FMS can be applied since children aged 3-10 years

Table 2 Continued

4	<p>J. O'Brien-Smith, R. Tribolet, M.R. Smith, K. J. M. Bennett, J. Fransen, J. Piond, M. Lenoir (2019)</p> <p>The use of the Körperkoordinationstest für Kinder in the talent pathway in youth athletes: A systematic review</p> <p>Journal of Science and Medicine in Sport Vol.22 Issue 9, September 01, 2019</p>	<p>Evaluating the use of the CEC motor competence test in detecting, identifying, developing, and selecting sports talent in</p>	<p>European countries</p> <p>Children and youth age of 6-18 years</p>	<p>Systematic Review with PRISMA</p>	<p>KTK motor competence test is useful for scouting sports talent at an early age. Among the other 3 test items, MS (moving sideways) can be used more to distinguish gifted and untalented than BB (Balancing Backward), JS (Jumping Sideways), and HH (Hopping for Height).</p>
5	<p>David J. Collins, Aine Macnamara (2017)</p> <p>Making Champs and Super-Champs—Current Views, Contradictions, and Future Directions</p> <p>Frontiers in Psychology 26 May 2017</p>	<p>Exploring psychological characteristics in sports talent identification</p>	<p>British Children from 6 years of age</p>	<p>Cross-sectional study with Analytical descriptive</p>	<p>Identification and development of psychological skills has been going on since the age of 6 years. Social support is one of the keys where the role of parents is very important</p>
6	<p>Joseph Baker, Stuart Wilson, Kathryn Johnston, Nima Dehghansai, Aaron Koenigsberg, Steven de Veegt, Nick Wattie (2020)</p> <p>Talent Research in Sport 1990–2018: A Scoping Review.</p> <p>Frontiers in Psychology 25 November 2020.</p>	<p>Knowing sports talent research throughout the ages and identifying research gaps to be developed in the future</p>	<p>54 countries mostly Australia, UK and Germany</p> <p>Ages 3-5 years and above 3-5 years</p>	<p>Scoping Review with PRISMA</p>	<p>Research involves aspects of physiological biomechanics to sport and developmental psychology. Aspects of cognitive perception and individual-environment interaction are quite widely discussed. More research is needed on sports talent, especially involving female and younger athletes and involving other countries (Africa, Asia, America)</p>
7	<p>Matthew J. Reeves, Allistair P. McRobert, Martin A. Littlewood &amp; Simon J. Roberts (2018).</p> <p>A scoping review of the potential sociological predictors of talent in junior-elite football: 2000–2016.</p> <p>Soccer and Society, 2018</p>	<p>Examining the sociological dimensions of the Williams and Reilly model regarding four predictors of potential talent in football (hours of training, coach-child interaction, parental support, and education)</p>	<p>Brazil, England, France, Ghana, Mexico, Portugal, Mexico, Sweden, Norway</p> <p>Under 16 players, coaches, club officials and parents</p>	<p>Scoping review with PRISMA</p>	<p>The results of the study show that all articles align with four potential sociological predictors of identifying and developing football talent. Hours of Practice (n=6), followed by coach-child interaction (n=4), parental support (n=2), and Education (n=1)</p>
8	<p>Craig Pickering, John Kiely, Jozo Grgic, Alejandro Lucia and Juan Del Coso (2019).</p> <p>Can genetic testing identify talent for sport?</p> <p>Genes Journal Volume 10, 2019</p>	<p>Knowing the extent of genetic influence in creating champions sports</p>	<p>Australian and Spanish (no sample age specified)</p>	<p>Cross-sectional Study with Analytical descriptive</p>	<p>There is no single genetic profile to predict success in sport. Genetic profiles tend to be specific according to the characteristics of each sport. The use of genetic testing to identify sports talent in children is considered unfounded and troubling. Genetic testing must be combined with other tools to obtain accurate identification of sports talent</p>

Table 2 Continued

9	Alexandra H. Roberts, Daniel Greenwood, Mandy Stanley, Clare Humberstone, Fiona Iredale, Annette Raynor (2019). Coach knowledge in talent identification: A systematic review and meta-synthesis. Journal of Science and Medicine in Sport Volume 22, issue 10, October 01,2019	Synthesizing coach knowledge regarding decision making in sport talent identification	Australian Coaches	Systematic Review with PRISMA	Trainers tend to use instinct in making decisions about talent identification. However, the coach also assesses three things that athletes show, namely: drive and ambition, game intelligence, and technical skills
10	Joseph Baker, Jörg Schorer, and Nick Wattie (2017). Compromising talent: Issues in identifying and selecting talent in sport. Quest Volume 70, 2018-Issue 1	A review of talent selection and identification in sports	Canadian and German (no mention of sample age)	Cross-sectional study with Analytical descriptive	Talent selection is only one step in an athlete's journey. Practitioners/trainers and policymakers should also focus on improving the ways in which these talents are developed.
11	Jaromir Simonek, Radoslav Zidek (2018). Sport Talent Identification based on motor tests and genetic analysis. Trends in Sport Sciences Volume 4 No.25	Explaining the role of physical fitness tests and genetic analysis- in identifying sports talent	Slovak	Quantitative with Experimental 7–8-year-old students	Genetic analysis is not compatible with physical fitness tests. Experts recommend using a combination of the two methods of genetic testing and “classic” motor testing in developing training programs and in finding gifted children.
Add-1	S.A. Tomaz, R.A. Jones, T.Hinkey, S.L. Bernstein, R. Twin, K. Kahn, S.A.Norris, C.E.Draper (2019) Gross Motor skills of South Africa preschool-aged children across different income settings Journal of Science and Medicine in Sport Vol. 22, Issues 6, p.689-694, 2019	Describing the Gross Motor Skills proficiency of preschoolers in urban and rural areas using TGMD-2	South Africa, ages 3-6 years old	Descriptive cross-sectional Study	93% the gross motor skills of preschoolers in South Africa are average and above. Rural children performed significantly better than urban children in the strike and horizontal jump. Better intervention strategies are needed for the development of specific sports.
Add-2	Tshepang Tshube, Lobone Kasale, Boga Manatsha (2022) A critical overview of sport development in Botswana International Journal of Sport and Exercise Psychology Volume 20, 2022- Issue 4	Providing a critical overview of athletic talent development programmes in the unique context of Botswana	Bostwana, South Africa	Analytical Descriptive Study	Some of the causes of the poor performance of the Botswana national team at the Olympics are lack of sports socialization, lack of talent development programs, lack of personnel and teacher-coach services, lack of research infrastructure.

## 5. Discussion

### 5.1. Physical Aspects in Talent Identification and Development in Sports Talent for Early Childhood

73% of articles (n= 8) stated that to identify potential sports from an early age it was necessary to measure the physical aspect. Various terms represent this physical aspect such as: genetic testing, motor coordination, fundamental motor skills, motor competence or motor quotient. The two articles discussing genetics do not fully support the use of genetic testing itself in identifying sports

talent. The results of the study [20] show that genetic analysis is not in line with the results of fitness tests. Genetic testing is considered inappropriate, especially for the selection of talented athletes aged 7-8 years, so it must be combined with other methods such as "classical" motor tests that have been widely applied so far. Although it has become a hot topic in the identification of sports talent, genetic testing has been widely disapproved because it is considered troubling [12],[30]. This is partly because it is impossible for athletes to have an ideal genetic profile and sports performance is more determined by training, tactical-technical skills, and other effects than from

genetics [19], [20]. Therefore, genetic testing is considered ineffective for predicting future elite athletes and not suitable for early childhood screening.

Aspects that are still closely related to physical aspects are biomechanical or technical abilities that are specific according to the type of sport (e.g. the ability to kick in taekwondo or dribbling ability in football) [22], [23], [31]. This technical aspect is considered less suitable for identifying sports talent in young children who have never joined a sports club because new technical abilities increase in line with planned training [9], [31].

Based on the articles studied, the physical aspect that seems more suitable for identifying sports talent in early childhood is fundamental motor skills (FMS) or motor quotient (MQ). The motor quotient that can be measured using the *Körperkoordination Test für Kinder (KTK)* is useful for knowing the motor competencies possessed by early childhood [6]. Motor competence can be applied to detect and identify sports talent in early childhood even though it is unstable [32], [33]. However, it is believed that motor competence is the foundation for perfection or mastery in performing specific sports movements, therefore they can predict future sports performance. FMS also provides an indication of future specific sports skills [22]. FMS is considered a motor skill that represents the "building blocks" or the basis for building specific movements in sports [34]. Measurement of FMS through the *Test of Gross Motor Development-2 (TGMD-2)* is appropriate for children aged 3-10 years [35], [36] making it suitable for identifying general sports talent in early childhood (0-8 years). TGMD-2 is the measuring tool most frequently used in research to determine fundamental motor skills (FMS) in early childhood in various countries [37]-[40].

The physical profile shows the difference between athletes with high sports skills and athletes with low sports skills. Interviews and questionnaires distributed to early childhood teachers in Indonesia revealed that teachers believe that the identification of sports talent in early childhood must contain or be closely related to aspects of physical motor development [41]. Aspects such as physical fitness should be mandatory and dominant in identifying sports talent for early childhood. The physical variables used in identifying sports talent in the early years must be fundamental in nature to provide a foundation for developing more specific movements at later ages. Physical variables that are relevant and supported by previous research in identifying early childhood sports talent are Fundamental Motor Skills (FMS), so that any form of development of sports talent identification instruments for early childhood needs to refer to aspects that exist in FMS such as: non-locomotor, locomotor, and manipulative movements. The results of the study [40] found that rural children are better at strike and horizontal jump than urban children. This is valuable information for developing rural children in sports such as baseball or softball in the future.

## **5.2. Psychological Aspects for Identification and Development of Sports Talent in Early Childhood**

36%, or four articles, stated that to identify potential sports from an early age, it is necessary to include psychological aspects. Although the physical aspect is the most dominant, or used 60% in identifying sports talent, the results of a systematic review from [8] state that the psychological aspect is one of the categories discussed in identifying sports talent. The three categories are as follows: cognitive/psychological capabilities, physical profile, and previous athlete's sports experience/achievement. [29] mentions that identification and development of psychological skills has taken place from the age of 6 years. Several forms of psychological characteristics can be developed such as resilience, a growth mindset, and a grit approach. Four predictor models of football potential also include psychological aspects used alongside physical, physiological, and sociological aspects [28]. In addition to physical aspects, technical skills, and game intelligence, drive or ambition is an assessment used by coaches in choosing talented football athletes [23].

Psychological characteristics are also believed to be a dimension that can predict the performance and appearance of future athletes [42], [43]. A range of research results explain how motivation is a strong predictor of the success of motor skills in children, as well as the success and commitment of athletes in training. Motivation is a reflection of mental toughness that indicates the athletes who maintain high performance standards despite obstacles [44].

From birth, every child is motivated [46], as demonstrated by their ability to fulfil their physical needs, such as feeding from the mother's breast. As children age, they are motivated to improve their abilities by rolling over, reaching for objects around them, moving, and expressing their desires in increasingly complex ways. Motivation is a suitable variable in the process of identifying sports talent in early childhood to accompany physical variables. Observations during the implementation of the FMS test revealed that motivated children were more enthusiastic and are better prepared to happily take part in an entire series of tests. In comparison, children who lacked motivation in carrying out the various FMS movements looked less interested, completed tasks in a makeshift manner, and complained easily [45], [46]. Motivation was a differentiator for children who do have sports talent and lack sports talent and, if socialization about sports is carried out properly and correctly [47], children will also be more interested and motivated in participating in sports.

## **5.3. Sociological Aspects of Talent Identification and Development in Sports for Early Childhood**

Selection or identification of sports talent is only one important step in long-term sports coaching. Therefore, [48] suggest that scientists and practitioners should not focus

too much on talent identification because talent development is more important and is an inseparable part of talent identification [4], [31]. In talent development, the sociological aspect plays a very important role.

27%, or three articles, stated that in the identification and development of sports from an early age, it was necessary to include sociological aspects. The four sociological dimensions identified by William and Reilly are often used in sports talent development: hours of practice, coach-child interaction, parental support, and education [28]. Support from family, teammates and coaches is an integral element that cannot be separated from identifying sports talent [24-26]. Athletes' families often make sacrifices in adapting their social life to support family members who become elite athletes, such as sacrificing accompanying time or talking to the media.

The development of sports talent means respecting the children's developmental stages. Therefore, it is important to monitor children's mental health alongside improving their sports performance. The role of parents becomes important in assisting the coach to not only to increase the children's skills but also helping increase their ability to cope. Social support is one of the keys to the success of future athletes [29].

Parental support is an important sociological dimension for increasing physical activity and developing sports talent in early childhood [49]-[51]. Parental support provides a sense of comfort for children so that the child is motivated and can experience intrinsic pleasure in exercising [52]-[54]. Research results show that parents can play a direct or indirect role in the specialization of sports for young athletes [55]. Parents play a direct role such as providing motivation, accompanying during training and matches. While parents play an indirect role, such as providing nutrition and additional training equipment needed. The importance of parental support is equal to the training factor [51], [56].

An ecological approach posits that the family is the closest environment for individuals [57], [58] and, especially in early childhood, the environment is a strong influence in shaping behavior. Support from parents as the closest environment will affect whether a child's sports talent is detected. Parental support also influences the development of future sports talent from early childhood. Parental support is, therefore, an important variable that needs to be identified early in the sports talent process. Previous research has identified that parents (both mother and father equally) naturally provide emotional support, instrumental support, informational support, and companionship support to their children who practice at early childhood sports clubs, [59].

## 6. Conclusions

The 11 selected articles reveal that sports talent identification and sports development in early childhood

cannot be separated from each other. Talent identification and the development of sports in early childhood can be measured using physical aspects that are fundamental to fundamental motor skills (FMS). Psychological aspects such as motivation and sociological aspects such as parental support are essential in completing a full picture. Empirical evidence provided in this study can be used as the conceptual basis for developing further research on the multidimensional talent identification and development in sport for early childhood.

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