Talent

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METHODOLOGICAL HANDBOOK WITH STANDARDS FOR THE DETECTION AND ASSESSMENT OF THE POTENTIAL OF TALENTED CHILDREN IN SPORT



CentarIzvrsnosti · Center for Social Innovation · KMOP Education Hub · Università degli Studi di Palermo

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Project Leader

CI SDŽ – Croatia | https://ci-sdz.hr/

Partners

SMOC – Bosnia & Herzegovina | https://smoc.ba/

UNIPA – Italy | www.unipa.it/

FSFV – Serbia | https://ni.ac.rs/en/

KMOP – Greece | www.kmop.gr

EAS – Malta | www.dualcareer.eu/

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1. Introduction

1.1 Limitations and Liability

The information provided in this handbook is intended for general guidance and to offer users insights into talent management, development, and other related topics. While we strive for accuracy, we cannot guarantee that all information is free from errors or omissions.

This handbook is not a substitute for professional advice or services in areas such as law. This handbook is not a substitute for professional advice or services in areas such as law, finance, or any other regulated field. Before making any decisions or taking actions that could have legal or other important consequences, consult with a qualified professional.

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1.2 About the TALENT Project

The TALENT project (Cloud-based education for creative sport talents) is spearheaded by the Center of Excellence of Split-Dalmatia County (CI SDZ) and is a multinational initiative involving seven countries: Croatia, Italy, Greece, Malta, Cyprus, Serbia, and Bosnia and Herzegovina. The

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consortium comprises: two university institutions—University of Palermo and the Faculty of Sport and Physical Education, University of Niš; three non-governmental organisations (SMOC - Sarajevo Meeting of Cultures, KMOP – Social Action and innovation centre, CSI - Center for Social Innovation), and one network organisation (EAS - European Athlete as Student). The project started on December 1st, 2022 and will span a period of 30 months.

Multinational Collaboration

The involvement of seven different countries—Croatia, Italy, Greece, Malta, Cyprus, Serbia, and Bosnia and Herzegovina—adds a layer of complexity and richness to the project. This multinational collaboration allows for the sharing of diverse perspectives, methodologies, and cultural nuances related to talent detection and development. It also enables the project to have a broader impact, potentially influencing policies and practices across multiple nations.

Partner Organisation	Country	Web Page Link
Center of Excellence of the Split-Dalmatia County (Lead)	Croatia	Website
University of Palermo	Italy	Website
Faculty of Sport and Physical Education, University of Niš	Serbia	Website
Sarajevo Meeting of Cultures	Bosnia and Herzegovina	Website
KMOP Education and Innovation Hub	Greece	Website
CSI Center for Social Innovation	Cyprus	Website
European Athlete as Student	Malta	Website

Diverse Consortium

The consortium is a mix of academic institutions, non-governmental organisations, and network organisations, each bringing unique expertise to the table. For instance, universities like the University of Palermo and the University of Niš can contribute research-based insights and methodologies. NGOs like SMOC, KMOP, and CSI can offer practical, on-the-ground experience and community engagement strategies. The presence of a network organisation like EAS can provide a platform for wider dissemination of the project's findings.

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Project Duration

The 30-month duration of the project allows for both short-term and long-term impacts. In the short term, the project can focus on immediate research, data collection, and pilot programs. In the long term, this extended period allows for the evaluation of these initiatives, adjustments based on findings, and the development of sustainable strategies for talent detection and development.

Scope & Goal of the Project

Scope of the Project:

The project aims to address various facets of talent detection and development, likely encompassing physical assessments, psychological evaluations, and skill-based tests. Given the diverse nature of the consortium and the multinational collaboration, the project has the potential to explore innovative, interdisciplinary approaches to talent management.

Goal of the Project:

- create preconditions for detection of young athletes' potential
- educate system stakeholders (coaches, athletes, parents, teachers)
- raise awareness of the importance of dual career and special needs of talented students
- reduce dropouts by choosing sport or school

1.3 Who is the Project for

Children, parents, teachers, coaches, sport professionals and the general public.

By understanding these aspects in depth, one can appreciate the multifaceted nature of the TALENT project and its potential to make significant contributions to the field of talent detection and development.

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1.4 Work Packages in the Project TALENT

In a project as comprehensive as TALENT, work packages are essential for effective planning and execution.

Work Package 1: Management and Quality Assurance

Objective: This work package has the objective to ensure that proper coordination across tasks and partners is maintained in order to achieve the overall project objectives within time, quality and budget constraints and EC's requirements. In order to do this, we will perform (1) a continuous monitoring of the execution of the project phases through its activities, milestones and deliverables, (2) a monitoring of the proper execution of the project according to its work plan, and (3) actions for the best possible collaboration among the partners and third parties.

Work Package 2: Standards for the recognition of talented children

Objective: Identification of the dual-career programs existing in the territory, its relationship with the school environment. Collection of policies about the school and the sport dropout. The outputs of this activity will be used to obtain information about the political and social context of talented children.

Work Package 3: Sport Talent Online Platform / E-STOP Platform

Objective: in this phase, the Leading Partner of the activity will create a Cloud containing all the practical information about how to recognize talent, to support children, to prevent their dropout, and to help them in maintaining this double-status within the future, by starting a dual-career program.

E-STOP Talent Online Platform comes in electronic, online form accessible to everyone with access to internet services. Its impact is immense, as it will spread across the entire society of the Consortium countries and act as two integrated big data systems. One part is an online e-tool for the data collection of tests and measurements which enables the longitudinal tracking of personal and performance characteristics of young athletes. Second part of the System will help all involved persons to get information needed for dual carrier education of young talented athletes. The Platform will allow a fast and valid exploration of characteristics that will help to keep the sport and educational development of young athletes on track. Instant analyses and

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benchmarking of personal and performance data offers valuable information for the coach, the athletes, teachers and their parents.

Work Package 4: Recognition of talented children

Objective: the creation of training materials for the TALENT Pilot training is the crucial point of the Project. School teachers and coaches from the STEM field will be trained to recognize talented children and support them, taking care of their needs and offering them an "adapted" education. After the development of training materials and methodology of talent recognition, the implementation of the Pilot training will follow.

Work Package 5: Dissemination and Promotional activities

Objective: The awareness-raising activities aim to spread information about the added value of sport and physical activity concerning the personal, social and professional development of individuals. It will involve school children and teachers, to create a supportive environment and stimulate cohesion. The Promotional activities will concern the organisation of events spreading innovative synergies between the field of sport and the fields of health, education, training, and youth. These events will involve parents, coaches, and teachers, and will represent an occasion of sharing opinions, problems and solutions. A good dissemination package will ensure a broad spreading of the message and the outputs created during the Project timeline.

Each work package is designed to align with the project's overall objectives and will be executed in collaboration with multiple consortium members to leverage their unique expertise. By incorporating these work packages, the TALENT project can ensure a structured, collaborative, and impactful approach to talent detection and development.

This handbook is a part of the third Work Package and a 3.2. deliverable.

1.5 Purpose of the Handbook

The primary aim of this handbook is to address the pressing challenge of identifying and assessing the potential of talented children in the realm of sports. The significance of this issue cannot be overstated; while there are numerous methods for identifying academic and artistic talents, standardised approaches for recognizing athletic gifts are often lacking or inconsistent.

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This gap in methodology can result in missed opportunities for young athletes, potentially hindering their development and depriving the world of future sports stars.

1.6 Scope of the Handbook

This handbook covers a wide range of topics, from the theoretical underpinnings of athletic giftedness to practical guidelines for its identification and assessment. It includes various sports disciplines, such as team and individual sports. The handbook also addresses the psychological aspects of talent in sports, including mental resilience, focus, and the ability to perform under pressure as well as social aspects of sports, such as socioeconomic status, family support, impact of local sport traditions etc.

1.7 Target Audience of the Handbook

The target audience for this handbook is diverse, encompassing professionals and stakeholders involved in the athletic development of children:

- Sports Coaches and Trainers
- Physical Education Teachers
- Sports Psychologists
- Parents and Guardians
- Athletic Scouts
- Sports Federations and Organization

1.8 Examples of Good Practice

1.8.1 Project Partner Countries Examples of Good Practice

Croatia

Methodology: Two focus group discussions were organized to determine standards for talented children in Croatia, one with teachers and the other with sport coaches. Participants, chosen through local networks, had over 5 years of experience working with children, ranging in age

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from early forties to 55. This diverse age range provided a broad spectrum of insights and experiences.

Results: The discussions highlighted the need for a standardized approach to talent identification in Croatia. Both teachers and coaches stressed early detection and specialized training. The consensus was that a more proactive approach is essential for optimal talent nurturing. Educators' Perspective: The first group of 13 educators emphasized a holistic approach to talent identification, focusing not just on academic skills but also on traits like curiosity and active participation. They believe that multiple facets of a child's abilities should be considered. Coaches' Insight: The second group of 13 sports coaches noted the lack of a standardized sports talent identification system in Croatia, emphasizing the importance of coordination abilities and character. They also highlighted the potential of early interventions in talent development.

Examples of Good Practice: The research project from the Faculty of Kinesiology in Split, funded by the Croatian Science Foundation, titled "Biological, chronological, and relative age in the process of establishing a National Sports Talent System" was highlighted as one of the best practice examples. This initiative is seen as a pioneering step in the right direction. Another example of good practice is also a project led by the Croatian Volleyball Federation (BIGG4VB), in which examples of good practice from countries that served as role models (Poland, Italy in indoor volleyball, Austria in beach volleyball) were analysed in various areas of activity, including in sports animation, detection, identification, and talent development."

Conclusions: Both educators and coaches agreed that Croatia lacks a unified system for talent identification. The current process is often inconsistent, relying heavily on individual professionals. Both groups emphasised the need for collaboration between the educational system and sports clubs, suggesting that a more integrated approach could yield better results.

Bosnia & Herzegovina

Methodology: Two focus group discussions were held to determine standards for talented children in Bosnia and Herzegovina, consisting of 12 educators and coaches from various fields. This diverse group provided a comprehensive view of the talent landscape in the region.

Results: The discussions emphasized the challenges in identifying and nurturing talent due to a lack of resources and specialized programs. The educators expressed a desire for more robust support systems to aid their efforts.

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Examples of Good Practice: Some schools have partnered with international organizations to offer training for talented children, leading to improved outcomes. These collaborations are seen as a beacon of hope in the talent nurturing landscape.

Conclusions: Despite challenges, collaborations can provide better opportunities for talented children in Bosnia and Herzegovina. There's a growing recognition of the need for more structured programs and resources.

Italy

Methodology: Two focus groups were conducted in July 2023, targeting educators and sports coaches. These discussions aimed to bridge the gap between academic and athletic talent nurturing.

Results: The discussions highlighted the lack of a structured approach to talent identification in academic settings and the importance of collaboration between educational institutions, families, and coaches. The need for a more unified strategy was a recurring theme.

Examples of Good Practice: Events spotlighting student talents and emphasizing the importance of long-term planning for budding athletes were discussed. These initiatives are seen as crucial in creating a culture of recognition and support.

Conclusions: Both groups emphasized the need for clear protocols for talent identification, dual-career training, and enhanced resources. The discussions underscored the potential benefits of a more integrated approach to talent development.

Serbia

Methodology: The Talent project organized focus groups to understand the needs of creative sports talents, involving teachers, educators and sports coaches. These discussions aimed to provide a comprehensive view of the talent landscape in Serbia.

Results: Teachers discussed the challenges of motivating students, while coaches discussed the complexities of measuring talent in sports. Both groups recognized the significance of fostering a nurturing and empathetic atmosphere for young athletes, emphasizing the importance of individualized support.

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Examples of Good Practice: Initiatives like enriched physical education classes and city clubs were discussed. These initiatives are seen as crucial steps towards creating a more supportive environment for young talents.

Conclusions: Feedback emphasized the importance of creating a nurturing environment for young athletes through collaboration and clear guidelines. The discussions also highlighted the potential benefits of a more integrated approach to talent development.

Cyprus

Methodology: Two focus group discussions were held under the TALENT project to identify standards for talented children in Cyprus. These sessions aimed to provide a comprehensive understanding of the challenges and opportunities in talent identification and nurturing.

Results: Teachers rely on observational techniques, while coaches primarily identify talent through performance observations. Both groups emphasized the need for more structured and standardized methods.

Examples of Good Practice: Initiatives like the TALENTO Sports Academy and the school's 'Talent Show' were discussed. These initiatives are seen as pioneering steps in the right direction.

Conclusions: Both groups in Cyprus highlighted the intricacies and challenges of identifying and nurturing talent. Teachers emphasized the importance of observational methods and diverse opportunities, while sports coaches stressed the need for structured tests and keen observation. Both groups acknowledged the importance of collaboration among stakeholders. They also recognized the need for standardized interventions and a balanced approach that considers both academic and athletic commitments. Differences in Perceptions: The teachers' group, with its broader educational focus, viewed the educational system as a platform for nurturing diverse talents. They discussed the challenges of catering to individual student needs in a traditional classroom setting and suggested a more generalized approach to talent identification. The sports coaches' group had a more specialized focus on athletic talent. They emphasized specific metrics, tests, and athletic traits. They also discussed the psychological challenges, including parental pressures, in athletic talent development. Both groups underscored the importance of standardized talent identification methods and collaboration among stakeholders. However, their unique professional backgrounds led to distinct insights. Collectively, their perspectives offer a comprehensive understanding of talent identification and

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nurturing, highlighting the need for a multifaceted approach and paving the way for future research and policy development in Cyprus. In essence, the focus group discussions across all countries provided a deep dive into the current landscape of talent identification and development. The insights gathered underscore the importance of collaboration, standardized methods, and a holistic approach to nurturing talent.

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2. Basic Terms

"Giftedness" designates the possession and use of untrained and spontaneously expressed natural abilities (called outstanding aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10 percent of age peers (see Figure 1).

"Talent" designates the outstanding mastery of systematically developed abilities (or skills) and knowledge in at least one field of human activity to a degree that places an individual at least among the top 10% of age peers who are or have been active in that field or fields (see Figure 1).

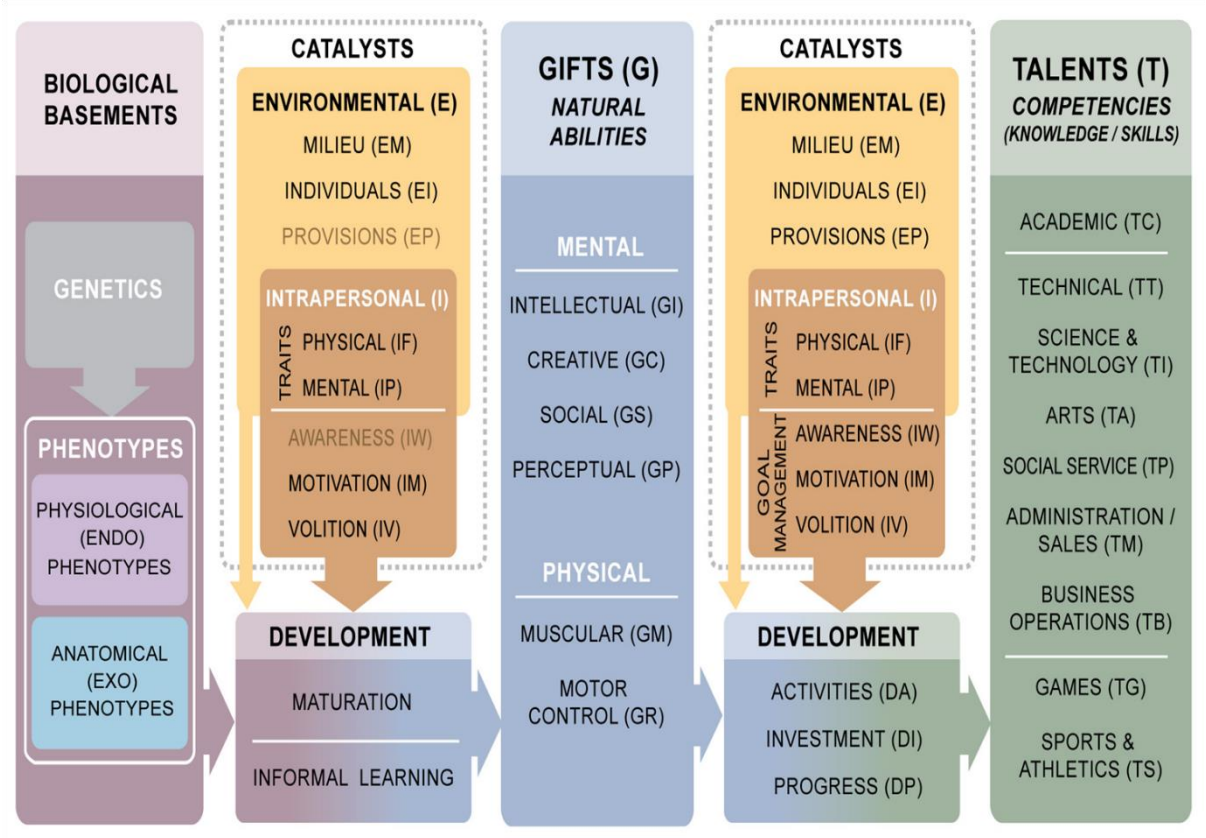


Figure 1. Differentiated Model of Giftedness and Talent (DMGT) (Gagné, 2004)

"Chronological age": number of years and days from birth. This can e.g. be determined by calendar.

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"Biological Age": degree of physical, mental, cognitive and emotional maturity of the child. To determine the biological age, one must view and assess skeletal development, sexual development and growth rate.

"Relative age effect": The term relative age effect (RAE) is used to describe a bias, evident in the upper echelons of youth sport and academia, where participation is higher amongst those born earlier in the relevant selection period (and lower for those born later in the selection).

"Training age": number of training hours from the beginning of the training process.

"Talent Detection" refers to the discovery of potential performers in a heterogeneous population of young people who are currently not involved in a specific sport .

"Talent Orientation" is related to talent detection and aims at motivating youngsters to choose a sport or a group of sports that matches the individuals' talent and their interest.

"Talent Identification" alludes to the process of recognizing current participants with the potential to excel in a particular sport.

"Talent Selection" involves the ongoing process of identifying players at various stages that demonstrate qualification levels of performance for inclusion in a particular team. It is perceived as "very short-term talent identification" as it is related to determining the most suitable athletes for a particular task at a given time.

"Talent Development" is offering optimal development and training opportunities by providing the most appropriate learning environment to achieve the maximum level of performance in a particular sport.

"Talent Confirmation" is the validation of the decision that was made at the talent identification process. After the baseline decision that was made to develop the talent of an athlete, an additional evaluation confirms the identified talent.

"Talent Transfer" is the opportunity that is offered to high-performing athletes to transfer their athletic ability to another sport. This shift in talent identification and development systems to increase the probability of identifying athletes that can attain senior expertise by minimising adolescent maturational issues, reducing talent development time frames, and maximising return on the developmental investment already made in these athletes.

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3. Basic Components of Talent Identification and Development Model

3.1 Animation for Sports

Animation, in the context of sports, refers to the engagement, motivation, and active participation of children in sports activities. It plays a pivotal role in fostering talent development, as it nurtures a child's intrinsic love for sports, enhances physical and cognitive skills, and cultivates a sense of discipline and teamwork.

Animation in sports serves as a catalyst for instilling enjoyment and passion in children. Engaging activities, playful exercises, and interactive games animate children, fostering a love for sports. This intrinsic motivation is fundamental for identifying and nurturing talent, as it encourages sustained participation and effort.

Animated sports activities focus on developing fundamental motor skills, agility, balance, and coordination. These foundational skills are crucial for identifying talent early on and providing a basis for specialised training. Children who exhibit proficiency in these skills may demonstrate potential for excelling in specific sports.

Animation encourages children to explore different sports, fostering creativity and adaptability. Exposure to a variety of sports allows children to discover their interests and strengths, aiding in the identification of potential talents. Creative play and exploration also enhance problem-solving skills and tactical understanding, essential components of sports proficiency.

Animated sports environments promote social interaction and teamwork. Children learn to communicate, cooperate, and compete in a healthy manner. Developing social and emotional competence is integral to sports talent development, as it contributes to mental toughness, resilience, and the ability to handle pressure and challenges.

Regular participation in animated sports activities contributes to children's physical fitness and overall health. It helps in building endurance, strength, and flexibility, which are vital for athletic performance. A strong foundation of physical fitness is essential for the long-term development and success of young athletes.

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Animation serves as a platform for talent detection and orientation as well as for talent identification and selection. Coaches and educators observe children's performance, skills, and behaviours during animated activities to spot potential talents. Early identification allows for tailored training programs, mentorship, and resources to nurture and develop the identified talents.

Animation in sports provides inclusive and diverse opportunities for all children, regardless of background or ability. It emphasises enjoyment and participation, ensuring that every child has the chance to explore sports and uncover hidden talents. Inclusivity in animation fosters a sense of belonging and encourages a diverse pool of talents.

Due to a multitude of complex factors, which encompass insufficient physical education in schools and a decline in outdoor play, many countries have witnessed the emergence of a generation of children over the past several decades who possess limited fundamental athletic skills (climbing, running, falling, and sprinting). It is an undeniable reality that today's children are notably less physically fit when compared to their counterparts from several decades ago. This issue of decreasing physical activity experience in children is a significant concern, leading to an alarming rise in childhood obesity and an elevated risk of developing lifestyle-related diseases such as cardiovascular conditions and diabetes in later life.

Given all the aforementioned factors, some experts believe that there is a 50% decrease in talent among children today. That's why promoting animation for sports activities is crucial. Here, a combination of a top-down approach (activities at the national and international levels aimed at raising awareness about the importance of engaging in sports and physical activity, which is then transmitted to the local level) and a bottom-up approach (sports and physical activity animation activities carried out by various associations, clubs, schools, etc., at the local level can be equally effective and inspire decision-makers at the national and international levels to take action) is applied.

Furthermore, animation activities targeting future parents and parents of children aged 0 to 5 years should be conducted. Additionally, special attention should be given to educational institutions such as preschools and schools. The rationale behind these target groups is that parents or caregivers play a crucial role in early childhood, while later on, preschools, schools, clubs, and associations take on a dominant role, with continued support from parents and other significant individuals in their immediate and extended surroundings, such as friends and coaches.

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All of these activities aim to encourage as many children as possible to be physically active and, if possible, for all children to master fundamental movement skills.

Such a process would also provide children with key motor skills that would enable successful involvement in either health-related physical activity or performance sport.

3.2 Talent Detection

Talent Detection is a process that leans on animation because the more children we get interested in physical activity at an early age, the better chances we have of detecting talents who are not yet involved in sports.

It is of utmost importance to involve children in a wide range of sports or physical activities at an early age so that they can develop a broad foundation of various motor movements and structures. Guided by the principle of "Early sampling instead of early specialisation," one of the models of sport participation, known as the Developmental Model of Sport Participation (DMSP), which comprises seven postulates, is implemented in sports preschools and universal sports schools. In these settings, children engage in activities from a variety of sports.

In a broader context, early sampling allows children, parents, and experts to identify which sport or group of sports a child may excel in. Ultimately, participating in multiple sports during childhood increases the likelihood that these individuals will remain sufficiently physically active in adulthood. They will possess not only the skills but also the character necessary for maintaining an active lifestyle.

Early specialisation is likely to lead to any immature fundamental motor patterns being carried forward and, at least temporarily, becoming part of an individual's pattern used in performing a sports skill. In other words, rather than acting as a building block, the incorrect fundamental movement skill may become the stumbling block.

In the case of early specialisation sports, specialised training for that particular sport begins as early as the ages of 5-7 (e.g., gymnastics, rhythmic gymnastics). However, for late specialisation sports, this specialisation typically starts approximately four years later.

For late specialisation sports, talent detection is a multi-year process that unfolds by closely monitoring children in preschools and the lower grades of elementary school. After the active

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start phase, which is characteristic for talent animation (Phase 1 in the FTEM model) (Figure 2), where the emphasis is on acquiring basic motor skills, the detection phase places a focus on developing fundamental sports skills (Phase 2 in the FTEM model). Consequently, it's essential that high-quality physical education is organised for all children as part of their time in preschools and the lower grades of elementary school. This should include at least daily one-hour sessions to meet the minimum recommendations from the World Health Organization regarding children's physical activity. In addition, supplementary activities in sports preschools and universal sports schools should be offered as options to all children as extracurricular activities or in collaboration with local sports clubs. At the local or regional level, multidisciplinary teams should be formed to cover the biopsychosocial component and monitor the developmental process of children closely. This holistic approach aims to nurture and identify talent in late specialisation sports while ensuring that all children receive a well-rounded physical education foundation.

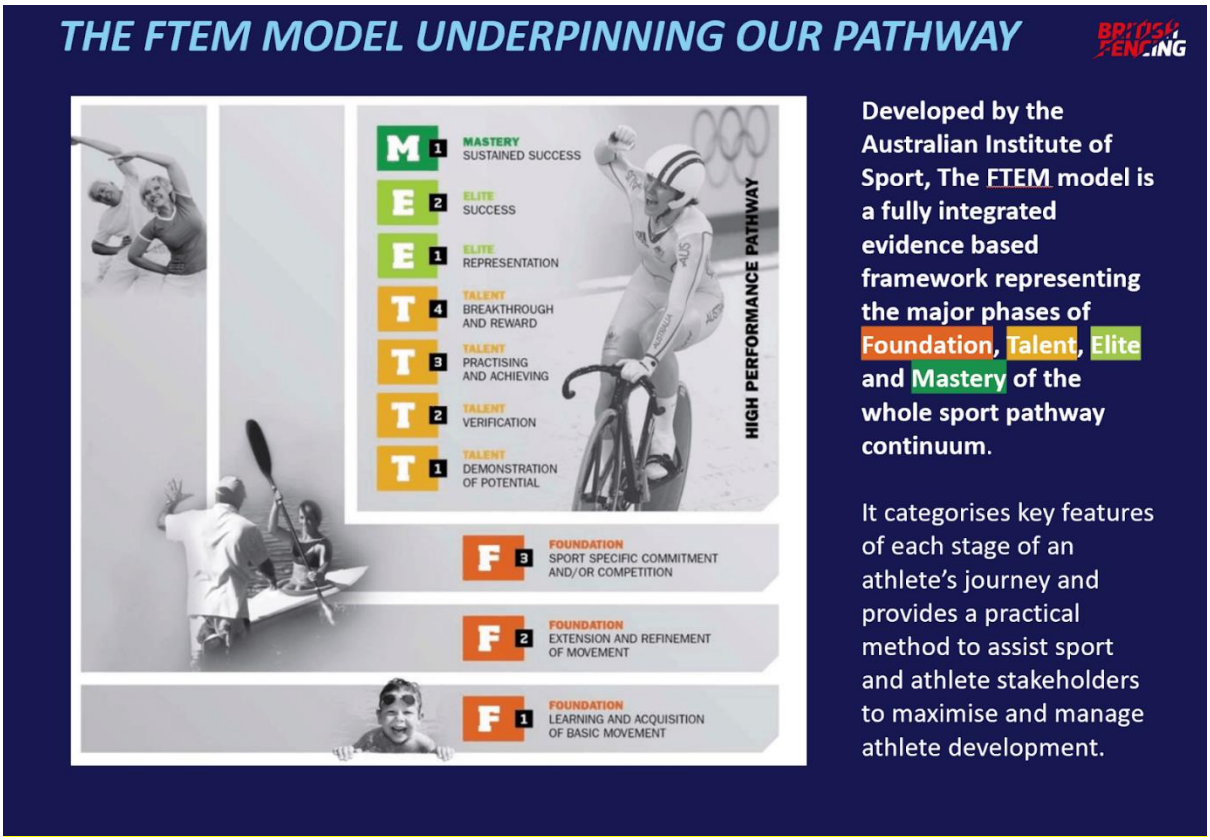


Figure 2. The FTEM model of sport pathway continuum

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In the realm of early specialisation sports, the talent detection process is notably shorter because children engage in specific sports training four years earlier than their late specialisation counterparts. This means they bypass Phase 2 in the FTEM model and transition from Phase 1 to Phase 3, which is the fundamental preparation phase in their chosen sport. Consequently, for these sports, both the detection and orientation processes are shorter, making them more susceptible to errors.

A potential solution to address these challenges is for clubs in these sports to organise programs, such as soft gymnastics for children, or even better, universal preschools and schools with enhanced programs in these sports. In this way, their expert teams can identify talents for early specialisation sports, and additional training can be arranged for these children, initiating the talent development and identification process.

However, it's crucial to consider how to neutralise the negative effects of early specialisation in early specialisation sports. One approach could involve incorporating a multisport element into each training session, dedicating, for instance, 10-15 minutes to various sports. This not only has numerous positive effects but also reduces the risk of overtraining due to the monotony of training content. It also mitigates the risk of athletes losing motivation, experiencing injuries, or dropping out of the sport. Another creative approach might involve introducing a concept of a "donor sport," such as a sports game specifically designed for swimmers or gymnasts.

Talent detection involves a multifaceted approach, encompassing various domains to provide a comprehensive evaluation of a child's potential.

In the realm of biological parameters, general tests of motor and functional abilities take centre stage, with a particular emphasis on evaluating overall coordination, typically measured using, for example, a KTK battery of tests. Additionally, anthropometric characteristics, such as body structure and somatotype, are considered essential variables in this assessment. Biological and training age are also critical factors to evaluate. Training age pertains to tracking how much physical activity children engage in, starting as early as the active initiation phase. This can begin with questionnaires directed at parents to gather information about their child's level of engagement. Subsequently, records from physical education classes in preschools and schools, as well as attendance data for sports preschools and schools, should be meticulously maintained. All this data should be interconnected within a unified database, enabling expert teams to access crucial information. For instance, they can identify that one child has accumulated 1000 hours of exercise, while another has 500 hours, serving as a valuable variable in talent assessment.

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In the psychosocial domain, interviews and questionnaires tailored to the child's age are pivotal. These can involve parents, caregivers, teachers, coaches, and members of expert teams. Additionally, predefined templates should be used to document observations during physical education classes and training sessions. It's essential that interviews and questionnaires for children are thoughtfully adapted to their age and comprehension levels.

This holistic approach to talent detection combines biological, training, and psychosocial factors, ensuring a well-rounded assessment of a child's potential in sports. The integration of data into a centralised database empowers expert teams with a wealth of information for precise talent evaluation.

3.3 Talent Orientation

Talent orientation is, in essence, a parallel process that unfolds alongside talent detection because, by the end of the detection process, we need to make informed decisions about which sports to recommend to parents and children. Children engage in physical activities both during regular classes in preschools and lower grades of elementary schools and within specialised sports preschools and schools. Among them, budding talents for sports, in general, are discovered, and efforts are made to provide them with additional high-quality training. Throughout this entire period, results obtained through measurements, testing, interviews, surveys, and expert assessments are continuously analysed. It is essential to establish criteria to determine which children should be directed toward specific sports groups or individual sports. In the Belgian model, for example, this involves a combination of performance assessment (I Do), sports preferences (I Like), and motivation and perceived competence (I Can) to help children select sports based on their preferences rather than just performance characteristics. It is crucial to emphasise the necessity of defining some kind of criteria, bearing in mind that it is a complex task that requires conducting longitudinal, prospective, and retrospective studies.

Standardised testing methods for physical performance are needed to better compare athletes from different sports, and the study aims to differentiate elite adolescent males using a comprehensive test suite in the Flemish Sports Compass.

For instance, analysing those who exhibited talent and those who did not for various sports can provide valuable insights into how they differed during the detection and orientation phases.

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This approach helps identify variables with predictive power, those that effectively forecast future success. Therefore, it's vital to have a data analysis department (BIG DATA) within the framework, responsible for implementing various contemporary methods—both linear and nonlinear, qualitative and quantitative. The primary goal is to enhance talent detection, guidance, and, subsequently, talent identification and development.

In recent times, the quest for identifying young prodigious athletes has been backed by scientific data, garnering the attention of decision-makers. For countries with smaller populations aiming to enhance their international competition prospects, refining the sports development trajectory is vital. Sporting bodies channel limited resources to enhance talent spotting initiatives. As a result, offering advisory services to educational institutions and sports organisations about nurturing gifted athletes becomes a tangible challenge.

3.4 Talent Identification and Selection

3.4.1 Talent Identification

Identification is a process of recognizing talents among children engaged in a specific sport or related group of sports. It begins in the F3 phase of the FTEM model. After detection, children are directed towards specific sports and undergo a phase of fundamental preparation, where they learn the basics of technique, tactics, conditioning in their chosen sport, and acquire foundational theoretical knowledge. Some children may have been identified as talents during the detection and orientation phases, but there are always others who later choose a sport and were outside the detection and orientation system. To reduce the risk of not recognizing a talented child, continuous monitoring of all children training in clubs is essential. It's possible to create a system in which as many children as possible participate in a particular sport in school clubs, and then those who show interest and talent can receive additional training in sports clubs.

In this phase, talent should be assessed using a more specific battery of tests that encompass the biopsychosocial domains. For instance, as children learn the fundamentals of technique and tactics, it's essential to monitor the speed at which they acquire these skills. This can be achieved by using tests that assess the quality of technique (specific coordination) and perceptual-cognitive skills, among others. In the realm of motor and functional abilities, employ more specific tests tailored to the chosen sport. Additionally, track body structure, composition, biological and training age. In team sports, identify talent for specific player roles, while in combat sports, consider the specificity of weight categories. In complex sports like athletics and gymnastics, evaluate talent for particular apparatuses or disciplines, or recognize versatility

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for multi-event competitions like heptathlons or decathlons. From the psychological domain, monitor perseverance, motivation, reactions to physical exertion, and psychological stress during training and competitions. In the social domain, analyse how socioeconomic status, sports tradition in a community, national and local policies, and the influence of significant individuals (parents, peers, coaches) impact the expression of talent and athlete progress during this phase and previous stages.

The FTEM model emphasises that the phases are not strictly chronological because children's developmental pathways in sports vary. However, we can provide some time frames, with the caveat that these are only rough guidelines. The T1 phase represents the beginning of the high-performance pathway, and for late specialisation sports, this phase can start very soon after children enter the F3 phase. For example, for a child who starts training in volleyball at the age of 10, we can already notice exceptional talent within a few months and direct that child towards high-performance training. Furthermore, if we track the detection and orientation process, we may already be in these phases for some children.

In recognition of the complexity and limits of athletic prediction, T1 represents an initial assessment of potential only and this must then be confirmed in the next stage at T2.

3.4.2 Talent Selection

While selection is, by definition, a process with a small gap between choosing and the chosen athlete's performance, it's a significant misconception to view selection as a single moment in time. It's crucial to highlight that selection is based on prolonged monitoring of athletes' development (their responses to training stimuli).

The initial level of talent is important, but so is the rate of progress. An increasing number of children struggle to keep up with the physical demands of training in younger age groups. For some, limitations arise from factors such as perseverance, motivation, emotional control in stressful situations, insufficient family and community support, inadequate infrastructure, and the absence of quality programs in their environment. This underscores how a combination of bio-psychosocial factors can have limiting, even negative, effects on athlete development.

The criteria for talent selection vary depending on the sport but generally include a combination of physical attributes, technical skills, and psychological factors. Physical attributes like speed, strength, and endurance are often measured through standardised tests. Technical skills are assessed through sport-specific drills, while psychological readiness is gauged through

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interviews and psychological tests. The aim is to have a holistic understanding of the athlete's capabilities.

The selection process usually involves multiple stages, beginning with initial screenings and culminating in more intensive evaluations. Initial screenings often involve large numbers of participants and use basic tests to identify promising talents. Those who pass this stage are then subjected to more rigorous assessments, often involving specialised coaches or scouts. The final selection is usually made based on a combination of test results, expert opinions, and sometimes even peer reviews.

Legal considerations in talent selection include ensuring that the process is fair, unbiased, and transparent. Anti-discrimination laws must be adhered to, ensuring that selections are made solely based on merit and not on factors such as race, gender, or socioeconomic status. Additionally, the use of biological data for selection must comply with data protection and privacy laws. Informed consent is often required when conducting physical or psychological tests.

3.5 Talent Development

Talent development is a process that runs parallel to all components of the system. An increasing number of countries recognize that this process begins in early childhood, leading them to create recommendations for physical activity for children as young as one year old (the active start phase of the LTAD model or F1 phase of the FTEM model). During the animation and detection phases, the parallel development of fundamental movement and sports skills occurs.

The journey of identified talents in a specific sport begins within the high-performance pathway. Along this path, it is essential to ensure all prerequisites for maximising potential development, including skilled personnel, infrastructure, competition systems, healthcare, and more.

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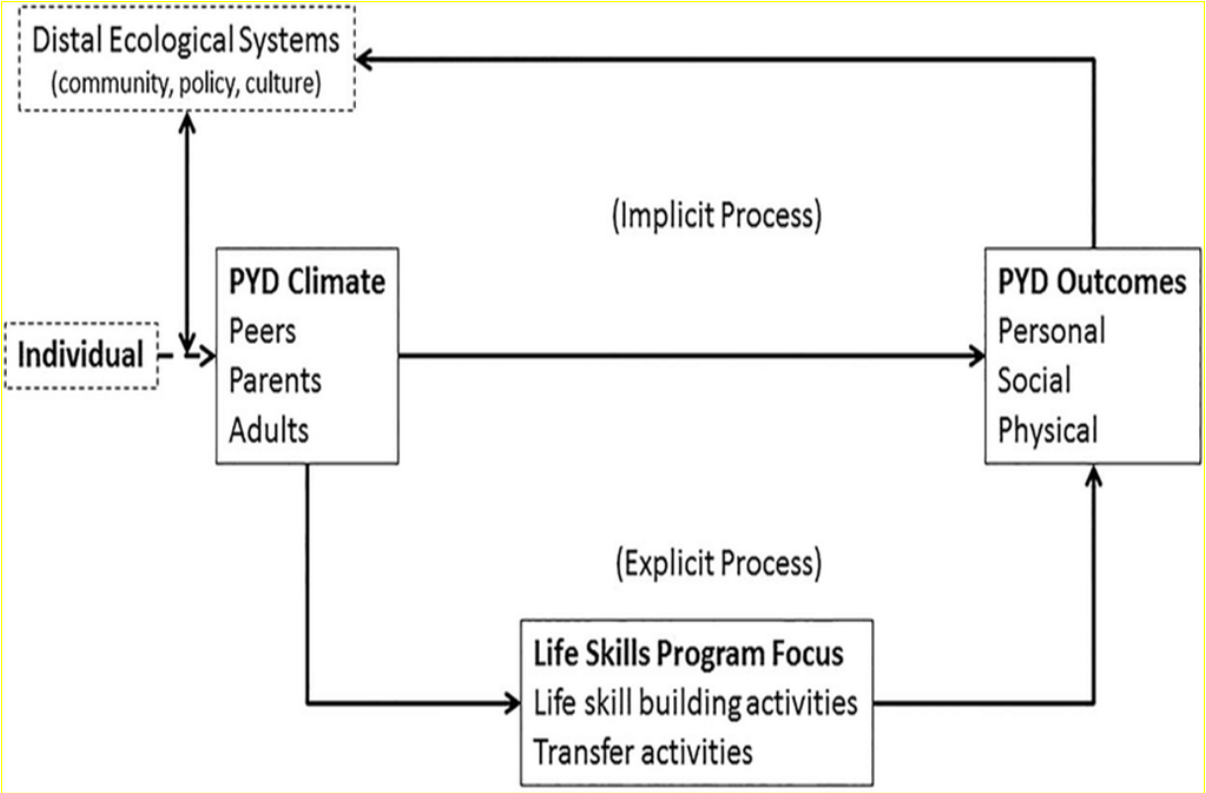


Figure 3. The model from Holt et al. (2017)

The development model of Holt et al. (2017) (see *Figure 3*) states that sport itself is neither inherently positive nor negative; it takes on the characteristics shaped by the participants involved in it. According to this model, a child enters the sports system, and their development is influenced by the Distal Ecological Systems. The immediate environment consisting of parents, peers, and other significant figures (coaches, administrators, etc.) also has an impact. During the developmental process, various explicit and implicit processes are activated with the aim of fostering the personal, social, and physical development of children, ultimately striving for positive outcomes. Explicit processes may involve targeted workshops designed to develop specific competencies and knowledge, while implicit processes are exhibited through various behaviours of coaches, parents, and others.

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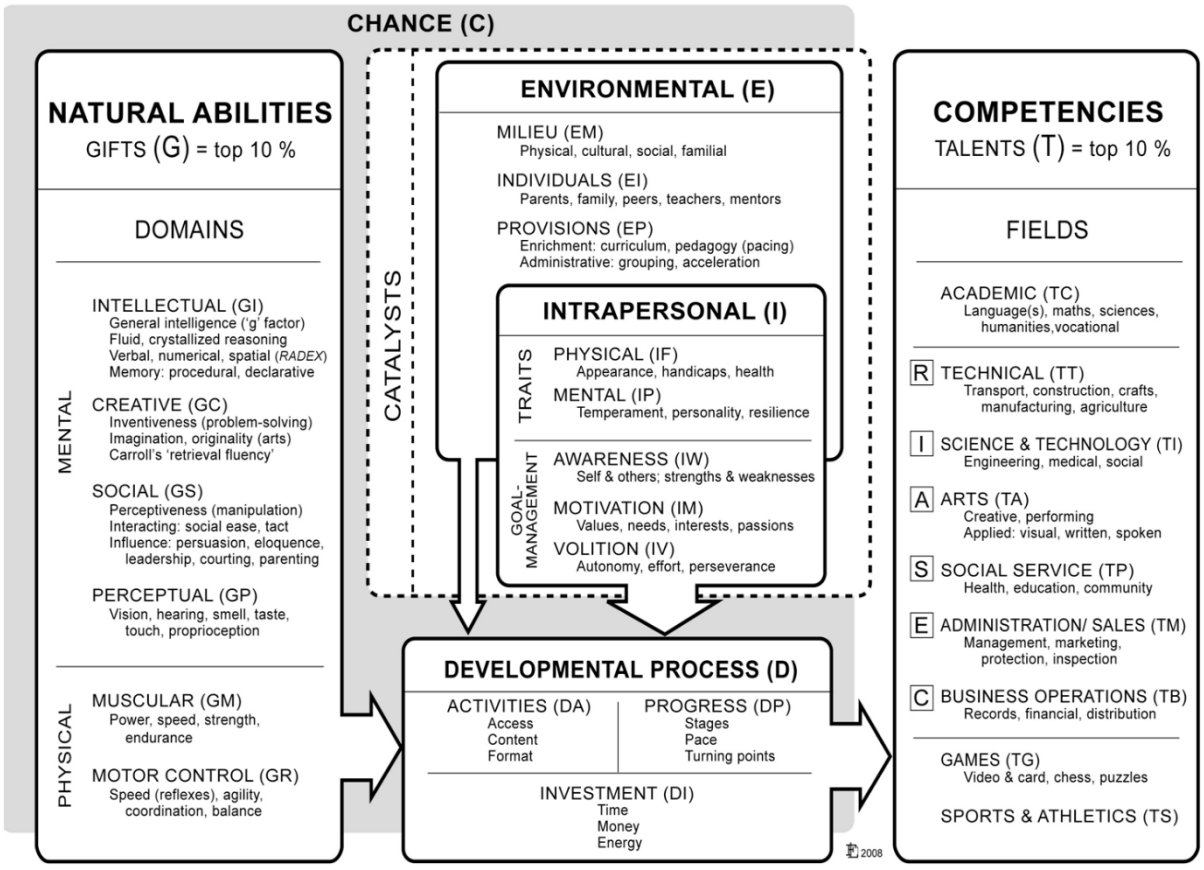


Figure 4. Gagne DMGT 2.0

From the second model by Gagne (Figure 4), we can observe that there are other factors that can influence talent development, such as luck, environment, content availability, and the like.

This phase arguably contains the largest cohort of future elite athletes yet they also represent the most vulnerable participants due to traditional funding and athlete support priorities being preferentially aligned to the ends of the pathway, rather than its middle. This can translate into a number of deficiencies in key development areas including coaching, competition, equipment, et.

Training programs form the backbone of talent development in sports. These programs are designed to be comprehensive, targeting not just the physical aspects but also the technical, tactical, and psychological facets of the sport. Periodization, a systematic planning of athletic training, is often employed to ensure that athletes peak at the right times. The effectiveness of a training program is often evaluated through regular performance assessments.

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Mentorship plays a crucial role in the development of young talents. Experienced coaches, senior athletes, or even external experts often act as mentors. The mentor-mentee relationship is built on trust and aims to provide emotional, tactical, and strategic support to the athlete. Mentorship helps in instilling a sense of responsibility, discipline, and ethical behaviour in young athletes.

Skill enhancement focuses on the refinement of specific technical abilities required in the sport. This could include advanced drills, simulations, and even virtual reality-based training. Skill enhancement is often sport-specific and may involve the use of specialised equipment and facilities. The aim is to bring the athlete's skills to an elite level.

Personal Development Plans (PDPs) are tailored strategies aimed at addressing the unique needs of each athlete. These plans are developed in consultation with coaches, psychologists, and sometimes even nutritionists. PDPs often include short-term and long-term goals, along with a detailed roadmap on how to achieve them. They are regularly updated based on the athlete's performance and developmental needs.

3.6 Talent Confirmation and Transfer

3.6.1 Talent Confirmation

Talent confirmation and transfer are pivotal stages in the athlete development pathway. Talent confirmation involves validating the potential and abilities of young athletes, ensuring they are on the right track for elite performance. Talent transfer, on the other hand, is the process of athletes changing sports to maximise their potential. This chapter explores the theories, methodologies, and implications of talent confirmation and transfer in sports.

During the T2 phase (FTEM model), a coach or a talent scout can form a more realistic view of athletic potential by observing and assessing an individual’s longer term atitudes for sport specific skill refinement, commitment, motivation, “trainability”, and other positive self management skills and characteristics. Confirmation of talent ideally leads to the formalisation of the sport’s support to the athlete within the T3 phase.

Having gained interest from talent scouts, coaches or national sporting organisations, athletes are now committed to higher levels of sport specific practice and striving for continual performance improvements that are focused on a benchmark outcome (T4 in FTEM model).

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Talent confirmation is a multifaceted process involving continuous assessment, feedback, and adaptation and it flows parallel to the process of talent development. It aims to validate the athlete's potential, refine skills, and optimise performance. Coaches and sports scientists employ various assessment tools, performance metrics, and psychological evaluations to confirm talent.

3.6.2 Talent Transfer

Considering that the talent development process spans 8 to 10 years from the beginning of a career to readiness for elite achievements, it's becoming increasingly common to try to expedite this process by taking well-established athletes from one sport and transferring them to another. This frequently occurs before the Olympic Games, with athletes from non-Olympic sports being transferred to related or sometimes unrelated Olympic sports. This shortcut reduces the entire process to a period of sometimes less than two years, from the moment of transfer to achieving top-level results at the senior level.

Talent transfer strategies focus on identifying transferable skills, assessing sport compatibility, and facilitating a smooth transition. Athletes undergo comprehensive assessments to determine their suitability for the new sport, considering factors such as physiological attributes, motor skills, and psychological traits.

Several factors influence the success of talent transfer, including athlete motivation, adaptability, support systems, and the similarity between the original and new sports. Understanding these factors is crucial for developing effective transfer strategies and ensuring positive outcomes for athletes.

Numerous case studies exemplify successful talent transfer, such as athletes transitioning from gymnastics to diving or from track cycling to rowing. These examples highlight the potential for cross-sport success and the importance of a well-structured transfer process.

Talent confirmation and transfer present several challenges, including athlete well-being, ethical considerations, and long-term development. Ensuring the welfare of athletes, addressing ethical dilemmas, and fostering sustainable development are paramount for the integrity of the talent development pathway.

Future research should explore the long-term impact of talent transfer, the development of standardised assessment tools, and the ethical implications of athlete transition.

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Advancements in technology, sports science, and ethical guidelines will shape the future landscape of talent confirmation and transfer.

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4. Important Roles in Talent Detection and Development Process

4.1 Distal Ecological System

The distal ecological system, in the context of the detection and development of sport talents, refers to the larger, often indirect, environmental influences that shape an athlete's journey. For instance, a country's national sports policies, which might prioritize certain sports due to historical successes or cultural preferences, can significantly impact where resources, such as funding and training facilities, are directed. Cultural values and traditions also play a role; in nations where sports like cricket or soccer are deeply embedded in the societal fabric, there's a higher likelihood of talent detection initiatives focusing on these sports. The media, too, wields considerable influence. Their portrayal of specific sports, athletes, and even narratives of success can either inspire or deter young talents from pursuing certain disciplines. Furthermore, societal expectations, such as gender norms related to specific sports, can either open doors or create barriers for budding athletes. Recognizing and addressing the nuances of the distal ecological system is, therefore, imperative for a comprehensive and inclusive approach to talent identification and development in sports.

Beyond the immediate influences, the distal ecological system also encompasses global trends and international successes. For example, a country that witnesses a neighboring nation excel in a particular sport might be inspired to invest more in that discipline, hoping to replicate similar successes. International events, like the Olympics or World Cups, often serve as catalysts, reshaping national priorities based on global benchmarks and competitions. Additionally, technological advancements and their global dissemination can introduce new training methods, equipment, or even entirely new sports disciplines, influencing the direction of talent scouting and development. Moreover, international collaborations, such as training exchanges or coaching programs, facilitated by the broader global sports community, can introduce diverse perspectives and expertise, further enriching the talent detection and nurturing ecosystem. As such, the distal ecological system's reach is vast, and its influences are multifaceted, making it a critical consideration in the holistic development of sporting talents.

4.2 Positive Youth Development Climate

4.2.1 Peers

Peers, in the context of the Positive Youth Development (PYD) model, are more than just friends or acquaintances; they are instrumental agents that significantly shape the developmental

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trajectory of young individuals. Their influence permeates various aspects of a youth's life, from emotional well-being to skill acquisition.

The enduring nature of peer relationships stands out as a defining characteristic in these studies. A participant in Fraser-Thomas and Côté's 2009 exploration depicted the depth and longevity of these bonds, emphasizing the camaraderie formed during collective endeavors, excursions, and the mutual encouragement intrinsic to such relationships. Echoing this sentiment, a participant in Olushola et al.'s 2013 study spotlighted the unparalleled fellowship athletes share, a bond that transcends mere training sessions and competitive events, culminating in a profound sense of unity and kinship. Such relationships bestow upon the youth a cherished sense of team spirit, collaborative training environments, and the privilege of forging friendships across diverse age brackets.

The following containts key aspects of peer influence on an individual :

1. Social Learning and Modeling:
Youth often adopt behaviors and norms observed within their peer groups. Positive peer influences can lead to constructive behaviors such as community involvement, academic diligence, and healthy lifestyle choices. On the flip side, negative peer influences might encourage risky behaviors. Hence, in PYD, there's an emphasis on nurturing positive peer environments to promote beneficial behaviors.

2. Sense of Belonging:
Peers play a pivotal role in providing a sense of community and acceptance. This emotional anchoring is vital for psychological well-being. Being part of a group can enhance self-worth, mitigate feelings of loneliness, and foster resilience against adversities.

3. Skill Development:
Interactions within peer groups offer practical arenas for youth to hone essential life skills. These include, but aren't limited to, effective communication, empathy, conflict resolution, and teamwork. Such day-to-day interactions are invaluable for personal growth.

4. Support System:
Peers often become the first line of support during challenging times. They offer emotional backing, share relatable experiences, and provide guidance. This support network is crucial in helping youth navigate the complexities of adolescence and early adulthood.

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5. Leadership Opportunities:
Peer groups in PYD offer avenues for youth to assume leadership roles. Whether it's spearheading a community project or leading a group discussion, these experiences are foundational for cultivating leadership qualities.

6. Identity Formation:
Adolescence is a critical phase for identity exploration and formation. Interactions with peers provide a platform for youth to discuss values, share experiences, and form opinions, all of which contribute to shaping their identities.

4.2.2 Parents

The role of **parents** in the talent development of children is pivotal. While their support can be instrumental in a child's success and confidence, it's essential to recognize that certain parental behaviors can also hinder a child's growth. Parents have the power to shape, support, and encourage their children, but they must be cautious not to inadvertently stifle their potential. They play a dual role in discovering, developing, and nurturing their children's talents. While their support and guidance are invaluable, it's essential to be aware of the negative impacts of certain behaviors. By striking a balance, parents can help their children achieve their full potential and become successful, well-rounded individuals. There are several stages of parents inclusion in the process of talent development:

1. Recognizing Talents

- *Understanding different talents* - Not every talent is tied to academic excellence or athletic abilities. Talents can be creative, emotional, social, or even spiritual.
- *Observation and listening* - Parents should be attentive to their children's interests and passions, as these are often the first signs of a hidden talent.

2. Encouragement and Support

- *Providing resources* - If a child shows interest in a particular activity, parents should provide the necessary resources, whether it's a musical instrument, books, or club membership.
- *Encouragement* - Praise and recognition can be powerful motivators. However, excessive or insincere praise can lead to overconfidence or dependency on external validation.

3. Setting Boundaries

- *Balanced life* - While it's important to encourage talents, it's also key to ensure that the child has a balanced life with time for play, socializing, and rest.

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- *Learning about failure* - Failure is an integral part of learning. Shielding children from failures or not allowing them to face challenges can hinder their resilience and problem-solving skills.

4. Communication with Experts

- *Seeking a mentor* - If a child shows exceptional ability in a certain area, it might be beneficial to seek a mentor or coach. However, pushing a child into mentorship without their interest can lead to burnout.
- *Talking to teachers* - Teachers can provide valuable insights into a child's academic and social talents. But relying solely on their perspective without considering the child's feelings can be detrimental.

5. Providing Psychological Support

- *Self-confidence* - While building their children's self-confidence is crucial, parents must avoid instilling arrogance or an inflated sense of self-worth.
- *Stress management* - Talent development can be stressful. Overburdening children with high expectations can lead to anxiety and mental health issues.

6. Negative Impact of Parental Involvement

- *Overbearing behavior* - Over-involved or "helicopter" parents can stifle a child's independence and creativity.
- *Projection of personal ambitions* - Parents who live vicariously through their children, pushing them towards achievements the parents wish they had accomplished, can cause resentment and pressure.
- *Comparison with peers* - Constantly comparing a child to their peers can diminish their self-worth and motivation.

4.2.3 Adults – Leaders/ Confirmation

The profound impact of solid relationships between young individuals and authoritative figures, such as program leaders, coaches, and educators, is a salient theme in the study of Positive Youth Development (PYD). These relationships cultivate a nurturing social milieu that champions PYD.

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The Role of Mentors in the Talent Development Process

Mentorship is a key tool in the talent development of an individual. A mentor serves as a guide, advisor, and support to someone striving to achieve their full potential. This chapter explores the importance and role of a mentor in the talent development process, as well as a proposed system for recruiting and educating mentors.

A mentor is an experienced individual who provides guidance, support, and advice to a less experienced person, often referred to as a mentee or protégé. This relationship is based on trust, respect, and a shared goal of personal and professional development of the mentee.

A mentor passes on their knowledge, skills, and experience to the mentee, helping them develop and learn faster. A mentor can provide access to important industries and professional networks.

A mentor should carefully listen to and understand the needs, ambitions, and challenges of the mentee. Also, a mentor assists the mentee in setting and achieving realistic goals. Constructive criticism and feedback are crucial for the growth and development of the mentee.

Mentor candidates should undergo a rigorous selection process that includes an interview, reference checks, and competency assessment. Furthermore, new mentors should go through a comprehensive educational program that includes courses on communication skills, mentoring techniques, and ethics. Establishing a system to monitor mentor performance, including regular feedback from mentees, is key to continuously improving the quality of mentorship.

As for the challenges of mentorship, it's important to clearly define expectations from both sides to avoid misunderstandings. Mentorship requires time commitment and effort from both parties.

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The Role of Educators, Teachers, and Instructors in the Talent Development Process

Educators, teachers, and instructors play a pivotal role in shaping and developing young minds. Through their expertise, passion, and dedication, they provide the foundation for discovering and nurturing talents in students.

Educator is most often an individual who cares for children at the preschool age, providing them with basic skills and fostering their curiosity. **Teacher** is an individual who provides primary education, guiding children through basic academic disciplines. **Instructor** is an expert who provides specific knowledge and skills in a particular subject or discipline, often at the secondary or higher education level.

It's crucial to recognize the individual inclinations and interests of each student for all educators, teachers and instructors included in talent development. Also, these adults should organize activities that allow students to explore and showcase their talents.

Every student is unique, so it's essential to tailor teaching methods to their specific needs. Encouraging students should be done through commendations and recognitions can boost their desire for learning and exploration.

Also, educators, teachers and instructors should offer opportunities for experiential learning through projects, experiments, and field trips as well as encourage critical thinking and problem-solving to develop skills needed for the real world.

When it comes to forming a healthy relationship and communication with parents, it is necessary to hold regular meetings with parents to discuss the progress and needs of the students. If a student shows exceptional talent in a particular area, educators, teachers, and instructors can connect them with mentors who can provide additional support and guidance.

Educators, teachers, and instructors are pillars of the education system and play a key role in the talent development of students. Through their commitment, expertise, and support, they provide the essential tools and resources that enable students to achieve their full potential.

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The Role of Coaches and National Team Selectors in the Process of Developing Sports Talents

Coaches and national team selectors also play a pivotal role in the identification, development, and promotion of sports talents. Their expertise, experience, and decisions directly influence the future of sports in the country. Their collaboration, expertise, and commitment to talent development ensure that athletes not only achieve their full potential but also that the country has a bright sports future.

1. Role of Coaches:

- *Talent Identification*: Coaches are often the first to recognize potential in young athletes. Their ability to see raw talent and visualize its potential is crucial.
- *Skill Development*: Coaches work with talents to develop their technical, tactical, and physical skills. They design training programs tailored to the individual needs of athletes.
- *Mental Preparation*: Apart from physical training, coaches assist athletes in mental preparation, teaching them how to manage pressure and develop a winning mindset.

2. Role of National Team Selectors:

- *Talent Selection:* Selectors are responsible for choosing the best players for national teams. Their decisions are based on current form, potential, experience, and how individual players fit into the team's tactics.
- *Strategic Planning*: Selectors plan how the team will look not only in current competitions but also in the future. They must think ahead, anticipating how the team will evolve.
- *Promotion of Young Talents*: By including young players in national teams, selectors provide them with an opportunity to gain experience, expose themselves to a high level of competition, and develop as players.

3. Collaboration between Coaches and Selectors:

- *Communication*: Regular communication between coaches and selectors is vital to ensure that talents are given the right opportunities and that their development is properly directed.

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- *Feedback*: Coaches can provide selectors with feedback on players' progress, strengths, weaknesses, and potential.

Other Stakeholders in the Sports Talent Development Process

Each of these roles provides crucial support in the sports talent development process, ensuring that athletes have all the necessary resources and expertise to achieve their maximum potential.

- **Physiotherapists** - experts who provide treatments and advice for injury prevention and support in rehabilitation and recovery of athletes.
- **Nutritionists** - advisors who optimize athletes' dietary habits to enhance their performance and recovery.
- **Sports Psychologists** - specialists who assist athletes in mental preparation and stress management to achieve peak performance.
- **Agents and Managers** - professionals who represent athletes' interests, negotiate contracts, and provide career guidance.
- **Scouts** - experts who identify and recruit young talents for professional clubs or sports academies.
- **Sports Scientists** - researchers who employ scientific methods to improve training and performance of athletes.
- **Sports-specialized Physicians** - medical experts who provide specialized care for sports injuries and ailments.
- **Team Coordinators** - individuals responsible for team logistics, including organizing travel, accommodation, and training schedules.
- **Media and PR Experts** - professionals who manage athletes' relations with the media and promote their public image.
- **Performance Analysts** - professionals who utilize statistical and video analyses to provide feedback on athletes' performance.

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5. Life Skills Program Focus

Life Skills Program Focus

Life skills play a pivotal role in the positive youth development (PYD) process. The emphasis on life skills in sports and other programs is to ensure that individuals are equipped to deal with the demands and challenges of everyday life. Life skills are defined as the physical, behavioral, or cognitive skills required for this purpose. What makes these skills particularly valuable is their transferability to other life domains.

The model of PYD through sport underscores the importance of both life skill building activities and transfer activities within the explicit process. This provides a roadmap for the development and delivery of life skills programs, emphasizing that transfer activities must be incorporated.

Life Skill Building Activities

Life skill building activities are pedagogical strategies specifically focused on teaching life skills. These activities are associated with promoting PYD. Here are some of the activities and techniques designed to promote life skills:

- Personal Life Skill Building Activities:
  - Establishing high expectations and accountability for behavior.
  - Role modeling of desired behaviors.
  - Use of keywords/phrases to instill values and principles.
  - Autonomy-building to foster independence.
  - Goal setting to provide direction and purpose.
  - Emphasizing academic performance alongside sports.

- Social Life Skill Building Activities:
  - Team building to foster unity and collaboration.
  - Volunteering and community service to instill a sense of responsibility and community spirit.

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Transfer Activities

Transfer activities are essential components of a life skills program. They ensure that the skills learned are not just theoretical but are applied in real-life scenarios. The model of PYD through sport specifies the need for these activities, highlighting their importance in the overall development process. By incorporating transfer activities, programs can ensure that participants can apply the life skills they've learned in various life domains, enhancing their overall development and ability to thrive in different environments.

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6. Positive Youth Development Outcomes

PYD outcomes can be broadly categorized into three main areas: Personal, Social, and Physical. Each of these areas encompasses a range of skills, attributes, and behaviors that contribute to the overall well-being and success of young individuals.

Personal Outcomes

Self-awareness: One of the primary personal outcomes of PYD is the development of self-awareness. Young people begin to understand their strengths, weaknesses, passions, and values. This understanding forms the foundation for setting personal goals and making informed decisions.

Resilience: Life is full of challenges, and resilience is the ability to bounce back from adversities. PYD programs equip young people with coping strategies and a positive mindset to navigate through tough times.

Goal-setting and Achievement: PYD encourages young individuals to set realistic and achievable goals. With the right guidance and support, they learn the importance of perseverance, hard work, and determination in achieving these goals.

Decision-making: As young people grow, they face numerous choices. PYD helps them develop critical thinking skills, enabling them to make informed and responsible decisions.

Social Outcomes

Communication Skills: Effective communication is crucial in all aspects of life. PYD programs emphasize the importance of both verbal and non-verbal communication, helping youth express themselves clearly and understand others.

Empathy and Compassion: Understanding and sharing the feelings of others is a vital social skill. Through PYD, young people learn to be more empathetic, leading to stronger and more meaningful relationships.

Teamwork and Collaboration: Whether in school, sports, or work, teamwork is essential. PYD fosters a sense of community and teaches the importance of collaboration and mutual respect.

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Leadership: Not only does PYD help young people become responsible members of society, but it also nurtures future leaders. Leadership skills such as taking initiative, motivating others, and problem-solving are honed through various PYD activities.

Physical Outcomes

Physical Fitness: Regular physical activity is a cornerstone of PYD. It promotes cardiovascular health, muscle strength, flexibility, and overall physical well-being.

Nutritional Awareness: Along with physical activity, PYD emphasizes the importance of a balanced diet. Young people learn about the nutritional value of different foods and the significance of making healthy choices.

Stress Management: Physical activities like yoga, meditation, and deep breathing exercises introduced in PYD programs help young individuals manage stress and maintain mental equilibrium.

Healthy Habits: Beyond just exercise and nutrition, PYD instills a range of healthy habits in young people, from adequate sleep to proper hygiene, ensuring a holistic approach to physical well-being.

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7. Proposition of Methodological Model for Talent Identification and Development

Based on previous research, studies and remarks on talent identification and development process, the idea is to create a new methodological model which will focus equally on biological, psychological and social aspects in the processes of talent detection, orientation, identification and development (see *Figure 5*).

Unfortunately, the current state of research in this crucial area does not provide a sufficiently comprehensive understanding of the key interactions between domains (biological, psychological and sociological), nor provide a sufficiently firm base for future progress and application. Rather, effective models and effective interventions are almost of necessity, required to address all three components and their interaction. In short, the biopsychosocial approach offers an effective basis for modelling and manipulating this crucial, but complex, facet of human behaviour.

Considering the non-linearity and individual dynamics of the development of specific traits, abilities, and skills, as well as the fact that certain attributes, abilities, and skills have varying impacts on success in different stages of a career (instability), it is not possible to predict, through a cross-sectional approach, who will be successful and who will not be in a particular sport in the future. On the other hand, a longitudinal approach is time-consuming and costly because it takes 8-10 years to analyse the dynamics of an athlete's development from a beginner to the phase of readiness for peak performance. In such studies, there is also a problem with reducing the sample size due to dropouts from sports or missed testing sessions.

The compromise solution we propose is that talent identification and development is a quasi-longitudinal approach that tracks the dynamics of athlete talent development in different age groups over a period of 2-3 years. Instead of following this dynamics longitudinally with a single group for 8-10 years (for example, from the age of ten to twenty), the quasi-longitudinal approach tracks, for instance, 4 different age groups over 2 years (e.g., U11-U13; U13-U15, U15-U17, and U17-U19). Two years provide enough time to gather information through measurements, testing, and expert assessments, not only about the initial level of abilities, knowledge, and skills but also about the dynamics of their development (tracking athletes' capacity for learning and progress over 2 years, as well as the dynamics of the development of individual dimensions of anthropological status and technique and tactics). Additionally, during this period, the readiness of athletes to adapt (physically and emotionally) to stressful situations

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during competition can also be monitored. In other words, athletes' reactions to stress are observed.

What is crucial in such a model is to explore, for each of the 3 domains, what needs to be acquired in each developmental phase (e.g., in each of the 10 subphases of the FTEM model), how to assess (measure, test) the level of these characteristics, abilities, skills, and how much influence can be exerted on them, if possible, when and how to influence them with the aim of their development. Afterward, create programs and provide access to the development of fundamental motor skills, healthy living skills, and psycho-social skills to as many children as possible. Monitor their progress and, based on the initial level and pace of progress, identify giftedness or assess talent. Provide gifted children with the best possible conditions for talent development (personnel, infrastructure, competition system, etc.). Enable all other children to engage in recreational sports (ideally, this group should also be monitored to reduce the possibility of not recognizing some talented child) by incorporating models for transitioning from sports for all to high-performance sports and vice versa. In the F phases of the FTEM model, the emphasis is on involving as many children as possible in the sports system and acquiring fundamental motor skills, as well as basic psycho-social skills. Here, we must not neglect the fundamental skills of taking care of one's body (injury prevention and treatment, proper nutrition, breathing, sleep, the harmful effects of mobile phone use, gradual progressive exposure of the body to sun, wind, water for immune system strengthening - very important because children will have more energy, be healthier, miss training and competition less often due to health problems, etc. This area can also be referred to as acquiring healthy lifestyle habits.

In this way, not only will the ultimate potential of every young athlete increase, but each level of the pyramid (each block) will also expand. In other words, more children will remain in the competitive sports system (being positively selected), and more children (who do not have the desire and/or potential for competitive sports) will stay in the “sports for all” system. To minimise the possibility of other variables influencing the athletes' results, it is necessary to neutralise the effect of factors such as biological and training age in assessing athletes' ultimate potential.

When testing athletes, the problem of choosing a test battery may arise, raising the question of whether the same one should always be used or different ones for different age groups. Furthermore, there is also an issue with the change in measurement characteristics of tests. For example, repeating coordination tests can lead to a loss of validity because they no longer trigger adaptation mechanisms - athletes have learned the performance. Similarly, with tests of

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the paper-and-pencil type, such as those used to assess certain psychological skills or traits. An important methodological problem is the failure to consider the individual-specific reactions of athletes to treatment in data analysis (for example, by only looking at average values, individual specificities can be overlooked).

Biological Domain

The sample of variables should cover a wide range of aspects, especially tailored to different player roles in team sports, various weight categories in combat sports, and different disciplines or apparatuses in complex sports like athletics and gymnastics. This should include anthropometric characteristics, such as height, arm span, or standing reach for specific roles like volleyball. Motor abilities, both general and specific, functional capacities, like workload capacity that correlates with the quantity and quality of training, should also be assessed. The quality of technique is crucial and can be evaluated through expert assessments using predefined scales. By comprehensively covering these aspects, a more accurate assessment of athletes' potential can be achieved across various sports.

Psychological Domain

In simple terms, effective talent development will recognise and cater for the varied pathways and different challenges individuals will face as they progress in their sport careers. While reflecting upon certain psychological factors being characteristic of those achieving the greatest success in sport, it is important to consider the role psychological factors perform within participation development models. These ‘psychological characteristics of developing excellence’ (PCDEs) include mental skills, such as imagery or goal setting, as well as the attitudes, emotions and desires young athletes need to successfully realise their potential.

One of the possible tests is “Athletic Coping Skills Inventory” (ASCI-28, Smith, Schutz, Smoll, & Ptacek, 1995), which was designed to assess seven psychological skill items that athletes use to manage their sports performance. The seven psycho-behavioural characteristics assessed were: coping with adversity, coachability, concentration, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure and freedom from worry. Additionally, Thomas et al. (1999), using their recently developed “Test of Performance Strategies” self-report instrument, found that both male and female international athletes use a wider range of psycho-behavioural characteristics (goal setting, imagery, activation, self-talk, emotional control, negative thinking and relaxation) in training and competition than those of a

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lesser standard. Consequently, it would seem crucial that any TID model considers these psychological characteristics of excellence.

Sociological Domain

Furthermore, social and environmental opportunities impact upon involvement at every stage and level of engagement, so, unlike the biological or psychological domains, the thesis underpinning this area comprises a range of social and environmental factors, such as family, socioeconomic status, geography and schooling, which significantly affect participation. In short, any future participant development models must not only acknowledge biological and psychological issues, but also reflect the social background of the participants. If future models fail to do so, they will be neither accurate nor effective.

For example, numerous studies conducted so far have proven that individuals of a lower socioeconomic status live differently than those of a higher one, i.e. that they are in a less favourable position in the structure of society. Family socioeconomic status (financial income, place of residence, quality of life) is connected with individual status. In most educational systems, there are differences in achievements that are related to the characteristics of the social background of the individual, in this case the student (Broer et al., 2019). Also, local social background such as the number of children included in sports can show the level of interest in specific sports in the local community. The differences between rural and urban areas can also have an influence on specific interests for sports and talent development.

Therefore, identification of potential must address both the ‘ability to get there’ as well as the ‘ability to be there’. Many traditional and popular talent identification models (e.g. Talent Search) use testing protocols that are based almost entirely on a snapshot of current performance (i.e. how well an athlete performs at that particular moment in time) as opposed to an individual’s capacity to develop in the future.

Beyond standard morphological and physiological benchmarks which dominate athlete selection, additional data sets that may be useful in assessing future athletic potential might also include the ease and speed of learning, a “growth mindset” constitution, and the proclivity for “self-regulation”.

When it comes to the frequency of measurements and testing, it is advisable to conduct assessments at least twice a year to monitor athletes' progress effectively. Organising these measurements should involve educating the assessors to minimise measurement errors and

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avoid using complex tests that consume too much time, as clubs are not typically tolerant of prolonged assessments. Creating a practical test battery is essential. Additionally, we recommend conducting pilot testing to optimise the testing process at each work unit and provide further education for the assessors, ensuring that the entire measurement and testing procedure runs smoothly. This approach contributes to a more efficient and accurate assessment of athletes' development.

For data processing, utilise appropriate methods, including multivariate and nonlinear approaches. For instance, employ novel linear algebra methodology, which combines a singular value decomposition (SVD) model with receiver operating characteristic (ROC) analysis to differentiate between groups of players. When interpreting an athlete's performance development from a dynamic systems perspective, it becomes essential to analyse athletic behaviour using nonlinear mathematical models that explicitly account for "chaotic" system behaviour. One valuable tool for this purpose is the neural network model, which enables the differentiation of talent levels through the self-organising Kohonen feature map method. In data analysis, don't solely focus on group indicators but also consider individual athlete responses to training programs

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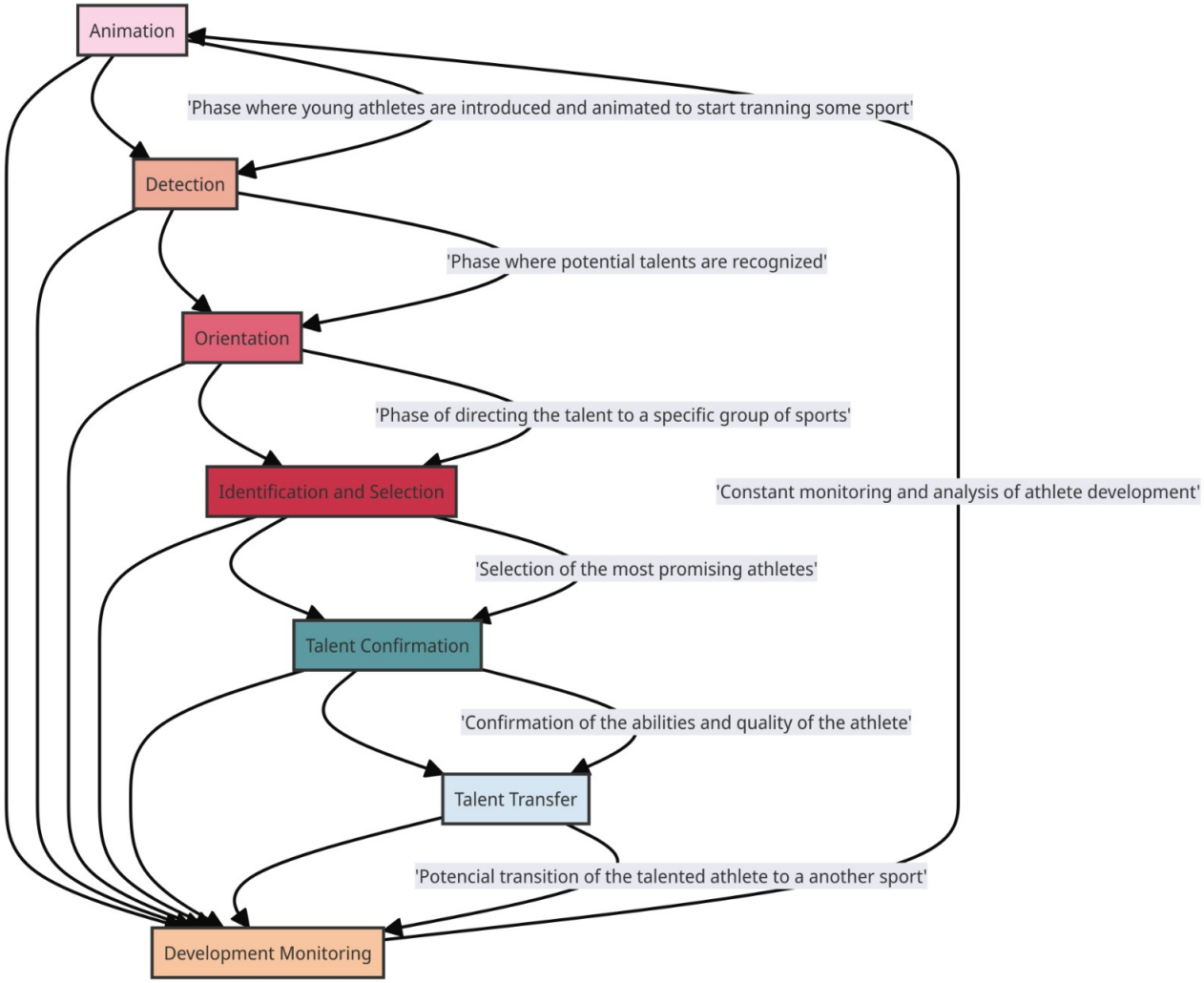


Figure 5. Graphical example of the model for talent identification and development

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8. Technology in Talent Management

8.1 Software and Hardware Tools

Software and hardware tools have revolutionised talent management in sports. From wearables that track physical metrics to software platforms that manage training schedules, technology plays a pivotal role. These tools provide a centralised system for monitoring and managing talent, making the process more efficient and effective.

Here's a list of modern technological devices that can be used in the talent development process in sports:

8.1.1 General Talent Management Tools

Wearables

- GPS Trackers: For monitoring speed, distance, and player positioning.
- Heart Rate Monitors: To track cardiovascular performance and stress levels.
- Smartwatches: For comprehensive fitness tracking, including sleep quality and recovery.
- Accelerometers: To measure the force and direction of movement.

Motion Analysis Systems

- 3D Motion Capture Systems**: For biomechanical analysis and technique improvement.
- High-Speed Cameras**: To capture and analyse fast movements in detail.

Training Aids

- Smart Cones: For agility and dribbling drills with real-time feedback.
- Virtual Reality Headsets: For mental training, game simulation, and strategy planning.
- Resistance Bands with Sensors: To measure force and tension during strength training.

Monitoring Systems

- Load Monitoring Platforms: To track and manage athlete workload and prevent injuries.
- Hydration Monitors: To measure hydration levels in real-time.
- Oxygen Level Monitors: For assessing aerobic fitness and optimising performance.

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Other Devices

- Drones: For aerial footage that can be used for tactical analysis.
- Smart Scales: To monitor weight, body fat percentage, and other health metrics.
- Temperature Monitors: To assess the optimal conditions for athlete performance.

8.1.2 Biological Age Assessment Tools

Hormonal and Biochemical Analysis

- Automated Immunoassay Analyzers: For measuring hormone levels like testosterone and growth hormone.
- Blood Chemistry Analyzers: To assess various biochemical markers like glucose, lipids, and proteins.

Genetic Testing

- Polymerase Chain Reaction (PCR) Machines: For genetic testing that can provide insights into biological age.

Bone Age Assessment

- Digital X-ray Systems: For hand and wrist radiographs to assess skeletal maturity.
- Ultrasound Bone Sonometers: To measure bone density and predict bone age.

Cardiovascular Assessments

- Electrocardiogram (ECG) Machines: To assess heart rate variability and other cardiovascular markers.
- Pulse Oximeters: For measuring blood oxygen levels, which can indicate cardiovascular fitness.

Respiratory Assessments

- Spirometers: To measure lung capacity and other respiratory metrics.
- Capnographs: For measuring the concentration of carbon dioxide in exhaled air.

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Physical and Functional Assessments

- Body Composition Analyzers: To measure body fat, muscle mass, and other parameters.
- Grip Strength Dynamometers: For assessing hand and forearm strength, which can be an indicator of biological age.
- Isokinetic Dynamometers: To measure muscle strength and power in specific movements.

Cognitive Assessments

- Computerised Cognitive Testing Systems: To assess reaction time, memory, and other cognitive functions.

Skin and Tissue Assessments

Dermatoscopes: For skin analysis, as skin elasticity can be an indicator of biological age.
Infrared Thermography Cameras**: To assess skin temperature variations, which can be related to metabolic age.

Miscellaneous

- Telomere Testing Kits: To measure the length of telomeres, which are indicators of cellular ageing.
- Metabolic Rate Monitors: To measure basal metabolic rate, which can change with biological age.

These devices, often used in combination, can provide a comprehensive understanding of an athlete's biological age, thereby aiding in talent identification and development.

8.2 Data Analytics

Data analytics has become an integral part of talent management. It involves the collection, processing, and analysis of large sets of data to derive actionable insights. This can range from player statistics to game strategies. Advanced analytics can even predict future performance, aiding in talent identification and development.

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Data Analytics Tools

- Sports Analytics Software: For in-depth performance analysis based on collected data.
- Video Analysis Software: For post-game or post-training session reviews.

8.3 AI and Machine Learning in Talent Management

Artificial Intelligence (AI) and Machine Learning are increasingly being used in talent management. These technologies can analyse complex data sets much faster and more accurately than humans. They can identify patterns and trends that may not be immediately obvious, providing a new layer of insight into talent identification and development.

Below are some types of AI and ML software suitable for talent development in sports:

Predictive Analytics Software

- Catapult Sports: Uses machine learning algorithms to predict injury risks and optimise player performance.
- SAP Sports One: Provides predictive analytics for player performance and game outcomes.

Player Performance Analysis

- Hudl: Offers video analytics and uses AI to automatically tag game events for easier review.
- Orreco: Uses AI to analyse bio-marker data to optimise athlete performance and reduce the risk of injury.

Talent Identification

- FC Python: Utilises machine learning algorithms to identify potential talents based on various metrics.
- Kinexon: Uses AI to analyse real-time player data for talent identification.

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Virtual Coaching and Training

- STRIVR: Utilises VR and AI to simulate real-game situations for training.
- HomeCourt: Uses AI to provide real-time feedback on basketball shooting form.

Game Strategy and Simulation

- Beyond Sports: Uses AI to simulate game scenarios for strategy planning.
- Second Spectrum: Provides machine learning-driven tactical insights.

Monitoring and Health

- WHOOP: Uses machine learning algorithms to analyse recovery and strain.
- FitGenie: An AI-powered nutritionist that adapts to the athlete's needs.

Cognitive Training

- Axon Sports: Uses cognitive training simulations that adapt in real-time using AI algorithms.
- Neuropeak Pro: Utilises AI to analyse and improve cognitive performance metrics like focus and decision-making speed.

Fan Engagement (Off-field Talent Management)

- IBM Watson: Uses AI to analyse fan behaviour and engagement, which indirectly can affect talent management by understanding fan-player dynamics.

Miscellaneous

- OpenAI Gym: A toolkit for developing and comparing reinforcement learning algorithms, which can be adapted for sports simulations.

These AI and ML tools can be used individually or in combination to provide a holistic approach to talent development, from identification and training to performance monitoring and health management.

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9. Ethical Considerations

9.1 Fairness and Equality

Fairness and equality are fundamental ethical considerations in talent management. This involves ensuring that all athletes, regardless of their background, have equal opportunities to be identified, developed, and succeed. Discrimination based on race, gender, or socioeconomic status is not only unethical but also counterproductive to the goal of finding the best talent.

9.2 Data Privacy

With the increasing use of technology in talent management, data privacy has become a significant concern. Athletes' personal and performance data must be securely stored and only accessible to authorised personnel. Failure to do so can lead to ethical and legal repercussions.

9.3 Ethical Dilemmas and Resolutions

Ethical dilemmas often arise in talent management, such as the conflict between maximising performance and ensuring athletes' well-being. These dilemmas require careful consideration and resolution, often involving consultation with ethical committees or experts in the field.

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