REVISITING SPORTS TALENT IDENTIFICATION: A META ANALYSIS

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Abstract

Talent identification is currently an option for stakeholders in sports to determine athletes who have talent and have the opportunity to succeed in the future. This is still being debated and proven through ongoing studies. The purpose of this paper is to conduct a Systematic Literature Review is to find answers to the following questions: (1) What methods are used in TI research? (2) What are the consideration criteria used in TI? (3) Which sports has been researched for talent search? From the SLR results, it was found that the sports that often used talent identification were football, rugby, and basketball. While the dominant criteria used in talent identification are physical, anthropometric, technical and maturity. Talent identification research is often in the form of correlation, regression and experimental studies using MANOVA. The contribution of the SLR results is to discover the novelty of talent identification research in terms of sports, criteria, and methods used. Meanwhile, from the practical side, this paper will be useful for developing a talent identification model that can be applied and helping volleyball trainers to determine talented athletes.

Keywords: Criteria, Method, Talent identification, Type of sport.

1. Introduction

Talent Identification (TI) is the process of identifying participants who have the potential to excel in a sport, providing a training environment that is very suitable for realizing potential in pursuit of excellence [1]. In recent years TI programs have developed in popularity and are seen as a very difficult way to maximize the potential of athletes to achieve success [2, 3]. Identifying and selecting talents involves predicting which athletes have the best potential [4, 5]. The problem that arises in talent search is that those involved in the selection of athletes are faced with a difficult job when identifying potential, without an objective or valid measure. As a result, coaches are asked to assess athletes based on the potential resulting from current performance levels [6]. This creates problems and creates the risk of incorrect predictive judgments.

Recent research on this matter continues. Not only questioning the criteria for consideration [4], and the right method, it also questions the efficacy of TI in predicting talent [2, 3]. The assumption that talent is a fixed capacity that can be identified early on, the influence of talent selection beliefs can be risky for talent selection decisions and forms the basis for a country to compete excellence in sports at the international level [2]. Unfortunately, however, the TI model is associated with low predictive value, its validity and usefulness are questionable [1].

The debate over the methods and judgment criteria used to identify talent for athletes never ends. Every time a study is found with a stronger/ dominant consideration criterion than other criteria, it is considered to be a determinant of the accuracy of the prediction so an exploration of previous TI studies regarding the consideration criteria, methods, and TI implementation in each sport is important to do. The purpose of this Systemic Literature Review is to find answers to the following questions: (1) What methods are used in TI research?; (2) What are the consideration criteria used in TI ?; (3) Which sports has been researched for talent search? The SLR results will be a reference for researchers when conducting research on talent identification.

2. Theoretical Framework

2.1. Talent identification

Talent identification refers to the process of identifying participants who currently have the potential to become elite players [7, 8]. This process requires prediction of participant performance over time by measuring physical, physiological, psychological and sociological attributes as well as technical abilities, either in isolation or in combination [9]. This suggests that identifying talent in sport as a process whereby individuals who are more likely to achieve success in a particular sport are identified according to certain test factors to bring about future success on the international scene. Appropriate support and training is essential if talented individuals fulfil their potential [10]. Therefore, early identification of gifted athletes is an increasingly important consideration for researchers and practitioners [11]. Once a gifted individual has been detected, essential but limited support resources can be used optimally to further refine and develop this talent. Without such support, the needs of gifted children may not be met and their gifts remain undeveloped.

Talent Identification (TI) in sport refers to the process of recognizing current athletes with the potential to achieve expert performance [1]. Talent Development (TD) prepares athletes for world class through a series of intervention programs, such as physical training. In pursuit of excellence in sport, many sports organizations have initiated or adopted TI/TD schemes [12, 13]. While developing athletes into elite players can be attributed to the TI program [14], it is important to note that the current research scope is limited to the investigation of TI sports achievement.

Therefore, in designing and developing an TI model, a key question is, 'which characteristics indicate that a person has the potential to develop in sports and become a successful athlete?' Since the goal is to predict future performance, the difference between the level of performance at the time of the test and the capacity one has to develop is very important. However, an evaluation of the philosophy underlying the practical and empirical TI model highlights that this difference is seldom known [15].

While TI through competition has operated since organized competitive sports began, systematic TI processes have recently become part of sports worldwide [16]. Eastern bloc countries such as the German Demo Republic, the Soviet Union, Bulgaria and Romania are examples of countries that have implemented talent identification programs that have been implemented systematically since the 1960s and 70s [17]. The sports success achieved by Eastern Europe has led to an increased spread of systematic TI processes around the world (e.g., Australian Talent Search program). A review of the typical procedures adopted by these countries highlights an TI approach that promotes systematic and objective measures regarding physical and perceived performance factors correlated with success in sport [18, 19].

2.2. Factors affecting sports performance

Research that discusses talent development currently emphasizes talent identification management and development systems [20]. Much of this work is supported by objective methodologies that suggest that the likelihood of successful talent development can be increased by knowing the factors that influence sports performance. This then becomes the basis for the consideration used in talent identification.

Talent identification research in its early development was widely used to identify talent in the sport of football in Europe [21, 22]. In one of the first papers to consider the development of British teenage professional football players, described four main psychosocial competencies that players possess: discipline, commitment, resilience and social support [23]. These studies indicate that both individual and social psychological factors have an important role to consider in identifying talents [24]. Athletes must have reliable mental or psychological qualities to achieve optimal performance.

Performance factors in sports that are often studied in talent identification studies are physical, physiological, anthropometric [25-27]. Physical parameters such as height and weight, while physiological capacity parameters: aerobic capacity, anaerobic strength [28]. A person's physical and technical abilities are important considerations in the study of talent [29]. Research in sports has found that certain anthropometric and physiological factors differentiate abilities between

players in various sports [30]. This study suggests that these factors should be explored for consideration in talent search [31].

Likewise, anthropometry, it is undeniable that sports, is associated with the physical requirements of the individual. Each sport has its own physical requirements, for example volleyball, requiring individuals with relatively high height, shoulder width and long legs [32, 33]. More deeply, anthropometric characteristics measured based on aerobic power, flexibility, and explosive strength are important determinants of successful performance in gymnastics [34]. These findings may have practical implications that certain body types are chosen for specific roles and have an important role to play in the success of aspiring athletes.

In addition to the sports performance above, technical factors also determine talent identification. Other studies suggest that a number of technical skills are required for aspiring athletes to be successful. Technical ability is of course based on the sport you are interested in/ occupied. Various studies have explored and investigated which aspects of the game can lead to success. The increased level of technical ability has shown results in technical skills and game tactics in international matches [35].

The factors that indicate sports performance are an inseparable part of identifying the talent of a prospective athlete. Each sport has a different opinion on which factors are the most important to consider in talent search. Talent identification in sports must be done multilaterally [36], as a factor that differentiates elite from sub-elite youth players, and this ability is considered useful as an index of talent identification. Therefore, we can note that the talent selection process must take into account many characteristics [36].

3. Methods

3.1. Definition of systemic literature review (SLR)

A Systematic Literature Review (SLR) is a method to identify, summarize, analyse, and interpret the collected literature to answer the formulated research questions by using a structured procedure [37]. By defining the criteria of literature selection, SLR can be used to describe hypotheses [38] and solve problems by evaluating, synthesizing, and assessing both quantitative and qualitative evidence [39]. In this study, the search of literature related to talent identification in sport was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline [40]. PRISMA is a common method of systematic search and meta-analysis [12]. Different from narrative literature review, SLR is more transparent, structured, and comprehensive in searching and synthesizing the literature.

3.2. Search strategy

Our systematic review focuses on talent identification among athletes. Two databases, namely ScienceDirect, and Routledge Taylor & Francis, were used to search literature using keyword search terms. Those databases were selected as their reputation was great and that both consisted of a lot of journals and articles in relation to sports talent identification, in addition to the fact that both are indexed by internationally reputable indexers. The keywords included Talent Identification (TI), Talent Identification in Sport (TIS), Talent Identification Methods (TIM), and

Talent Identification Criteria (TIC). The inclusion and exclusion criteria followed a report from Ahmadi et al. [5] (see Table 1). The search was limited to articles in scholarly journals published between 2016 and 2020 under the subject of sport coaching. Books, theses or dissertations, brief reports, non-empirical studies, and non-English literature were not included in the analysis. Finally, 40 articles were selected for literature review.

Table 1. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Language: English	Articles written in other languages
Time: January 2016 until July 2020	Before year 2016
Empirical research published through international conferences and international journals	Chapter book types, thesis, short reports, non-empirical study or articles.
Associated with the identification of talent	All scientific disciplines except in talent identification performance assessment

The number of papers found in the two data bases at each stage can be seen in Table 2. The first stage found 1,617 papers. The second stage, after being filtered based on inclusion and exclusion criteria, found 237 papers. Finally, we found 40 articles relevant to Talent Identification.

Table 2. The number of articles found at each step.

Data base	1st step filter: Keyword	2nd Step filter: Year of publication between, subject, journals	3rd step Article with relevant content
Science Direct	433	95	15
Routledge Taylor & Francis	1.184	142	25
total	1.617	237	40

4. Results and Discussion

The search results on two databases, namely ScienceDirect.com and Routledge Taylor & Francis, produced 40 articles relevant to the identification of talent in sports. Table 3 presents the author's name, criteria, method used, and the type of sport that has been studied regarding talent identification research.

Table 3. Summary of TI papers published in two data bases.

No.	Author	Criteria	Methods	Type of Sport
ScienceDirect				
1	Singla et al. [41]	muscular strength upper body balance Strength	Pearson correlation coefficient	Cricket
2	Taha et al. [42]	fitness motor ability	linear regression-Artificial Neural Networks (ANN)	Archers
3	Lovell et al. [43]	somatic maturity,	Linear-mixed models using log transformed	Football

		physical performances		
4	Hirose and Seki [44]	Anthropometric Motor ability	Correlations	soccer
5	Louzada et al. [45]	physical, technical	multivariate statistical analysis	Soccer
6	Woods et al. [46]	Anthropometry Physical	Binary logistic regression models	Football
7	Fontana et al. [47]	Anthropometric, Physical	Multivariate analysis of variance (one-way MANOVA)	Rugby
8	Woods et al. [46]	Physical technical skill	Regression-generalized estimating equations (GEE)	Football
9	Filipas et al. [48]	Physic Psychology	A randomized counterbalanced cross-over design	Rowing
10	Till et al. [49]	Anthropometry physical	Intraclass correlation coefficients	Rugby
11	Ubago-Guisado et al. [50]	Anthropometry	Correlation-analysis of covariance with height as covariates.	football, basketball, and handball, swimming
12	Mitchell et al. [51]	anthropometry maturity	Multiple linear regression models	swimming
13	Ntai et al. [52]	Anthropometric Physical	MANOVA	Fencing
14	Höner and Feichtinger [53]	Psychological Motor performance Technical	cross-sectional analyses	Soccer
15	Portas et al. [54]	Maturity	non-invasive practical method	Soccer
Routledge Taylor & Francis				
16	Woods et al. [46]	Technical and physical fitness	Spearman's nonparametric correlation matrix	Football
17	Rommers et al. [55]	motor coordination speed Physical	MANOVA analyses	Soccer
18	Faber et al. [56]	Psychology Physical	Systemic review	tennis, table tennis, badminton and squash,
19	Brazo-Sayavera et al. [57]	age effect/maturity	Distribution-chi square test	Athletic
20	López-Plaza et al. [58]	maturity physical fitness, morphological anthropometric	(ANOVA)	kayakers and 82 canoeists
21	Ramos et al. [59]	maturational, morphological physical attributes	intraclass correlation coefficient (ICC)	Basketball
22	Francioni et al. [60]	Anthropometric Technical and functional test result	MANOVA	soccer

23	Till et al. [49]	relative age, anthropometry fitness	multivariate analysis of variance (MANOVA) test	Rugby
24	Wilson et al. [61]	Technical skill	Multivariate analysis	Soccer
25	Tredrea et al. [62]	Anthropometric Performance and physiological attributes	Binary logistic regression analyses	Rugby
26	Arede et al. [63]	Physical capacities	A cluster analysis (Ward's minimum variance method)	basketball
27	Tribolet et al. [64]	Anthropometric Maturity Motor competence Fitness Technical	MANOVA	football
28	Datson et al. [65]	Physical performance	Akaike information criteria (AIC) logistic regression model	soccer
29	Woods et al. [46]	Physical Technical Perceptual-cognitive	A multivariate analysis of variance	football
30	Fenner et al. [66]	Physiological Technical attributes	A Pearson correlation coefficient test	soccer
31	Robertson et al. [67]	Anthropometry Physical performance Motor coordination skills	MANOVA	Racquet
32	Höner et al. [68]	Motoric	ANOVA	Football
33	Fornasiero et al. [69]	Physiological and anthropometric	A one-way analysis of variance (ANOVA) w	Cyclists
34	Ishihara et al. [70]	executive functions	Regression analysis-Bivariate correlation	Tennis
35	Zago et al. [71]	Biomechanics	MATLAB (The MathWorks Inc., Natick, MA)	Soccer
36	Read et al. [72]	Physical Anthropometry	Magnitude-based inferences	Rugby
37	Hill et al. [73]	Maturation	Ordinal regressions	Football
38	Spratford et al. [74]	Biomechanical Anthropometric Isokinetic	regression	Cricket
39	Woods et al. [46]	Technical skill	Linear Discriminant Analysis (LDA)	Football
40	Román et al. [75]	Isometric Plyometric	ANOVA	Basketball

In Table 3, it can be seen that studies on talent identification have been carried out in many sports. Game sports are most frequently studied in talent identification research, compared to other sports. Although one type of sport was found, it was archery, which was studied through talent identification. The rest is game sports, both team and individual. Meanwhile, from the criteria for consideration of talent identification, it was found that previous researchers generally compared physical attributes with other attributes. For example, by comparing physical attributes at several age levels of prospective athletes, or seeing the effect of anthropometry on physical abilities. Therefore, physical attributes are most often discussed in sports talent identification studies. From the search for the methods used in previous Talent Identification research, it was found that the methods used were very diverse. The method most often found is using the Multivariate analysis of variance (MANOVA) analysis tool.

Furthermore, the search results in the two data bases are sorted based on the criteria for consideration for scouting sports talent, the method used and the sport being studied. Figure 1 presents the research classification of talent identification in sports based on the criteria for consideration in determining the talent of a prospective athlete.
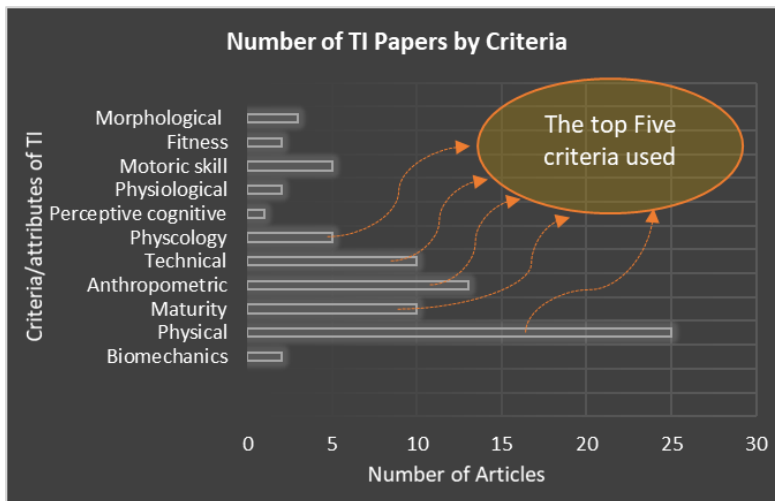

**Fig. 1. Classification of talent identification research based
on the criteria for consideration of talent for prospective athletes.**

In Fig. 1, it can be explained that physical attributes are the most frequently studied attributes in talent identification research. As many as 25 of the 40 articles that examined physical attributes as attributes that are considered important for assessing sports performance and can be used to identify the talents of prospective athletes. Meanwhile, other attributes (anthropometry, technical, maturity and psychology) were reviewed by 5-13 articles.

Meanwhile, the type of sport studied in relation to talent identification is described in Fig. 2.
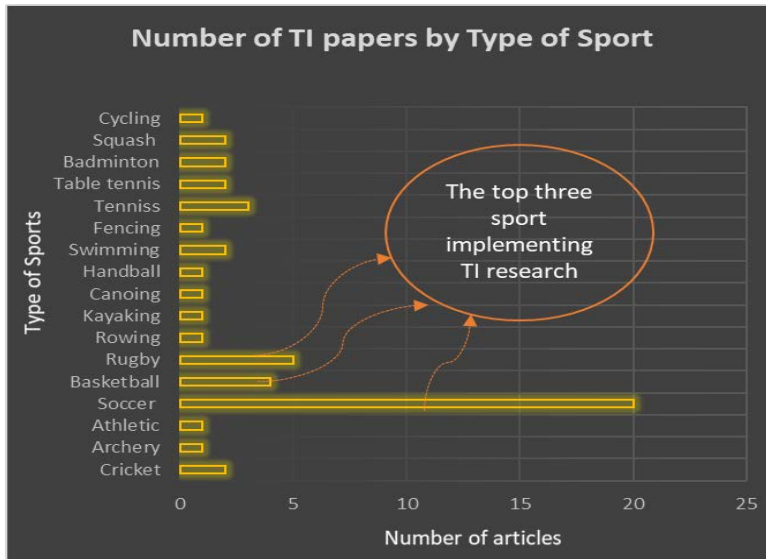
**Fig. 2. Classification of talent identification
articles based on the type of sport.**

In Fig. 2 it can be seen that talent identification research is mostly carried out in soccer or football. This is followed by rugby and basketball (4 and 5 articles). The rest of other sports such as rowing, cricket, and squash were found 1-2 articles related to talent identification. From the search results above, it can be said that volleyball has not implemented talent identification in developing athletes. So that this can be a novelty for researchers.

Whereas Fig. 3 presents the article classification based on the methods used in talent identification research. It can be seen that the methods often used in sports talent identification research are regression, correlation, and experimental methods using MANOVA.
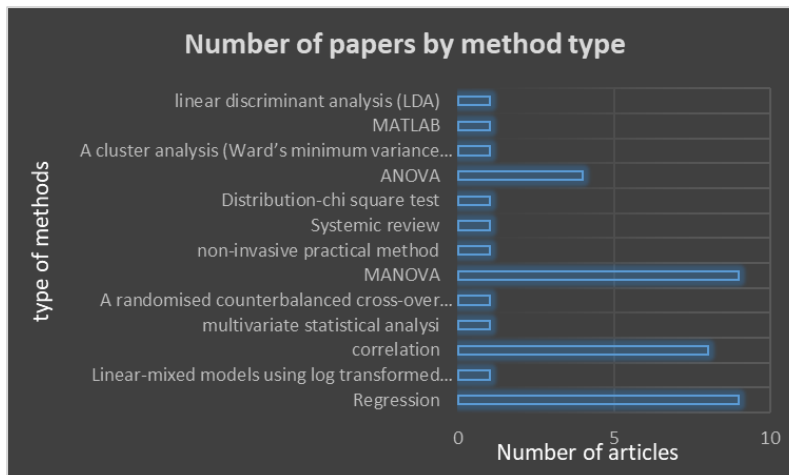

Fig. 3. Classification of articles based on the method.

5. Conclusion

This paper emphasized athletes' talent training and development predicted to have future potential and models used in sports talent identification through an SLR method. It has been proven that there have been a variety of methods used for the STI; however, the most frequently used one was Multivariate Analysis of Variance (MANOVA). In the meantime, studies on STI were mostly found on gaming sports rather than other types. In terms of focus of studies, classification of physical attributes is considered the most crucial factor to assess sports performance and is able to identify athletes' talent. The factor is then followed by anthropometric, technical, maturity, and psychological factors.

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