REVIEW ARTICLE

Sporting talent in volleyball: A scoping review

JÚLIA RIBEIRO DE OLIVEIRA[1], FRANCISCO ZACARON WERNECK[2], MAURÍCIO GATTAS BARA-FILHO[1]

[1]*Faculty of Physical Education and Sport. Federal University of Juiz de Fora. Juiz de Fora, Minas Gerais, Brazil.*
[2]*Faculty of Physical Education and Sport. Federal University of Ouro Preto. Ouro Preto, Minas Gerais, Brazil.*

ABSTRACT

The aim of this study was to investigate the available literature on sporting talent in volleyball, and critically analyse what else has been researched in the area, methodological approaches, knowledge gaps, and encouraging future research. The search strategy was carried out in four electronic databases (PubMed®, Scopus, SPORT Discuss and Web of Science) using the PRISMA-ScR methodology (extension for Scoping Reviews). 78 articles were included for the final analysis. Most studies analysed female athletes (56.4%), in a cross-sectional design (85.9%), with group comparison (60.3%), bivariate analysis (66.7%) and application of test batteries (91%) of anthropometric (62.8%) and physical-motor (56.4%) characteristics. There were few studies that adopted a multidimensional (20.5%) and retrospective/longitudinal approach (11.5%), evaluated psychological skills (7.7%), subjective coach analysis (25.6%), motor coordination (9%), maturation (9%) and sociocultural characteristics (5.1%). Thus, talent identification in volleyball generally uses batteries of tests to discriminate between skill levels, mainly using physical tests (anthropometric and physiological measures), but the evidence for their validity in predicting future performance and discriminating skill levels is limited. Future research should adopt multidimensional and longitudinal approaches, combining objective and subjective indicators of sporting potential of young volleyball athletes.
Keywords: Sports performance, Athlete, Expertise.

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Corresponding author. *Federal University of Juiz de Fora, Faculty of Physical Education and Sport, Juiz de Fora, Minas Gerais, Brazil.*
E-mail: juliafaefid@gmail.com
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INTRODUCTION

The field of sporting talent has aroused the interest of the academic community in recent years (Baker et al., 2020). In parallel with this increase, the number of identification and development talent programs has grown, as they aim to recognize athletes with the potential to excel within their specific sport, as well as provide a suitable systematic training environment for the development of their capabilities (Barraclough et al., 2022).

In this context, there is still no consensus in the literature on the definition of sporting talent due to the lack of methodological rigor in research (Baker et al., 2019). Despite these inconsistencies, the studies agree that sporting talent is multidimensional (Roberts et al., 2019), as it involves the interaction of individual aspects and the environment (Paula et al., 2021), and thus within the individual factors is the potential of specific sporting talent abilities of the sport modality along with the psychological capacities, physical and cognitive, which enable the attainment of high performance (Issurin, 2017). Furthermore, sporting talent is considered to be non-linear (Roberts et al., 2019), i.e., the characteristics of talented individuals change during the long-term training process.

Volleyball is a team sport with unpredictable game situations that require players to make quick decisions (Claver et al., 2016). In addition, volleyball is an intermittent sport, in which, during the match, athletes perform high and low intensity actions and rest periods. Thus, the volleyball athlete who reaches the elite level is the one who has excellent physical-motor preparation (Altavilla et al., 2022), excellent anthropometric characteristics (Tsoukos et al., 2019), as well as cognitive (Waelle et al., 2021), psychological (Rabaz et al., 2015), technical/tactical (Lopes et al., 2016) and favourable environmental aspects (Coutinho et al., 2021).

From the perspective of identifying talent in volleyball, studies demonstrated that the coach plays an important role in this process (Formenti et al., 2022; Stanovic et al., 2020). Generally, coaches use their "*instinct*" (Roberts et al., 2019) to analyse the performance of the athletes in competitions and performance in physical tests when choosing the one with the best chance of reaching high performance (Baker et al., 2019; Johnston et al., 2018). However, the use of assessments together with the opinion of the coach may constitute an excellent tool for detecting talent.

Thus, research demonstrates that the field of sports talent is highly complex, since it is characterized in a multidimensional manner and specific to each modality, considering that each sport has its own specificity, requiring different talent characteristics. Recent systematic reviews (Johnston et al., 2018) and scoping reviews (Baker et al., 2020) have analysed the literature on talent in various sports. However, there is a lack of literature reviews addressing sporting talent in volleyball.

In this way, the aim of this research review was to investigate the available literature on sporting talent in volleyball, and to critically analyse what has been most researched in the area, methodological approaches, in addition to identify knowledge gaps and encourage future research.

METHOD

This scoping review followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Liberati et al., 2009; Tricco et al., 2018). This type of review has as an objective to carry out a collection of information already available within the literature on a thematic subject in order to obtain a better understanding about the trends and shortcomings (Baker et al., 2020).

Eligibility criteria

The articles that were included for analysis, after reading the title, abstract and full text, respectively, were those that met the criteria: (1) published between January 2000 and July 2022, (2) written in English, (3) original articles (books were excluded, commentaries, theses, dissertations, notes, conference abstracts and letters to the reader), (4) contained information on volleyball athletes (studies on coaches were excluded), (5) contained relevant data on sporting talent in volleyball (studies with multiple indicators: anthropometric, physical-motor, psychological, cognitive, technical/tactical; performance prediction, athlete selection and career analysis), (6) included comparisons based on skill level of athletes and by age group (e.g. more skilled versus less skilled and under-15 versus under-17, respectively), (7) athletes under 18 years of age (except retrospective studies with athletes over 18 years of age and studies comparing age groups that included the adult category), (8) did not focus on the effect of relative age. The exclusion criteria were: (1) articles on the effect of training, (2) studies that only evaluated match performance analysis (used DataVolley software), (3) comparison between genders (female versus male), (4) comparison between modalities (for example, volleyball versus basketball), (5) health outcomes (for example, injuries, COVID-19, doping), (6) descriptive articles, (7) articles that compared non-athletes/control group or compared athletes from different playing positions (e.g. outside hitter versus central midfielder), (8) studies on paralympic athletes and (9) studies on beach volleyball athletes.

Search information

The searches were conducted in July 2022 in four databases (PubMed®, Scopus, SPORTDiscus and Web of Science) by Author and Author. All the databases have a broad scope in the field of sports science, and to identify the articles in each database separately, the search terms were applied. The external search included the bibliographic reference lists of the articles included for analysis and indication of the articles performed by a renowned researcher in the field of sporting talent.

Search strategies

The search strategy was divided into the following stages: (1) search in electronic databases; (2) secondary search using external sources. The first stage consisted of searching the four databases: PubMed®, Scopus, SPORTDiscus and Web of Science. The establishment of the terms for the search in the databases was carried out by means of a review of the existing literature in the area, in order to identify the most commonly used terms on the subject. In order to combine the terms and search for articles in the databases, we used the Boolean operators OR & AND. Thus, the search terms utilized, considering the title and abstract of the articles were:

("*talent**" OR "*expert**" OR "*gift**" OR "*ability*" OR "*aptitude*" OR "*skill**" OR "*select**" OR "*champion**" OR "*finalist*" OR "*success**" OR "*develop**" OR "*identif**" OR "*prognos**" OR "*predict**" OR "*diagnos**" OR "*career*") AND ("*volleyball**") AND ("*young**" OR "*youth*" OR "*junior*" OR "*adolescent**" OR "*athlete**" OR "*elite*")

The second stage consisted of reading the bibliographical references of the articles found in stage 1, as well as consulting a specialist in the field of sporting talent who suggested original articles that might fit the eligibility criteria.

Study selection and data collection process

The studies collected in each database were processed in EndNote X9 (Clarivate Analytics, Philadelphia, USA), and duplicate articles were removed automatically and manually. The reading of titles and abstracts was undertaken by two independent researchers (Author) and (Author) following the eligibility criteria, and in any conflicts a third reviewer (Author) decided on the inclusion or not of the study. The abstracts that lacked

decisive information were selected for full-text reading. The data was recorded in an Excel spreadsheet specifically for this review.

Data items

The articles included in this review were thoroughly assessed by the Author researcher, who initially extracted general information from the studies: name of the author(s), year of publication, name of the journal, title and objective of the article, theory/concept of sporting talent, design (cross-sectional, intervention/tracking and longitudinal/retrospective), whether or not there was a division of groups (by skill level or age group) and statistical analysis of the study (bivariate, multivariate or qualitative analysis).

In addition, the results related to the sample were analysed: sample size (<20 participants, 20-50 participants, 51-100 participants, 101-200 participants, 201-500 participants or >500 participants), nationality of the sample, gender (female, male or mixed), age (adolescent - 12 to 17 years; adult - + 18 years or mixed) and skill level of the participants (expert - international level, advanced - national level, intermediate - state level, basic - regional/local level and novice - inconsistent/beginner or mixed) (Baker et al., 2015).

Moreover, the following talent/athlete results were also evaluated: anthropometric, physical/motor/physiological indicators, psychological skills, technical, tactical/cognitive, quality/quantity of practice/training, performance in competitions, motor coordination, sociocultural characteristics, biological maturation and the coach's subjective evaluation. The indicators of sporting talent were classified as: restricted to the individual, the task and the environment. Further, the studies were classified as multidimensional (those that assessed 4 or more indicators within sporting talent) or non-multidimensional.

Furthermore, when the articles were classified as group division, performance prediction and future success/career pathway, the results were classified as positive, i.e., when there was a difference between groups or if the variables analysed predicted performance or if the variables were determinant in the career of the athlete, respectively. The results of the group division were also classified as contradictory, i.e., when some variables made a significant difference and others did not. And finally, the results were also classified as negative, that is, when there was no significant difference in any variable or if the variables failed to predict performance or if the variables were not determinant for career progression, respectively.

Synthesis method

No meta-analysis was planned. A narrative synthesis of the data was performed.

RESULTS

The first phase identified 5 113 articles from the search of databases using the keywords cited. In the second phase, 29 articles were identified through external sources. 2 468 duplicated articles were removed, and after reading the titles and abstracts, 2 575 were excluded, 2 550 from the first phase and 25 from the second phase. In addition, 7 articles were not found in the entirety of the literature and were consequently excluded. This left 92 articles for the evaluation of the whole text. After a meticulous reading of the studies, 14 articles were removed, and thus a total of 78 articles remained in the final analysis of the study (see Figure 1).

Figure 2 illustrates the distribution of studies published in the defined time interval (2000-2022). It can be seen that of the 78 articles analyzed, 16.7% were published between 2000 and 2009, 26.9% between 2010 and 2014, 28.2% between 2015 and 2019 and 28.2% between 2020 and 2022.

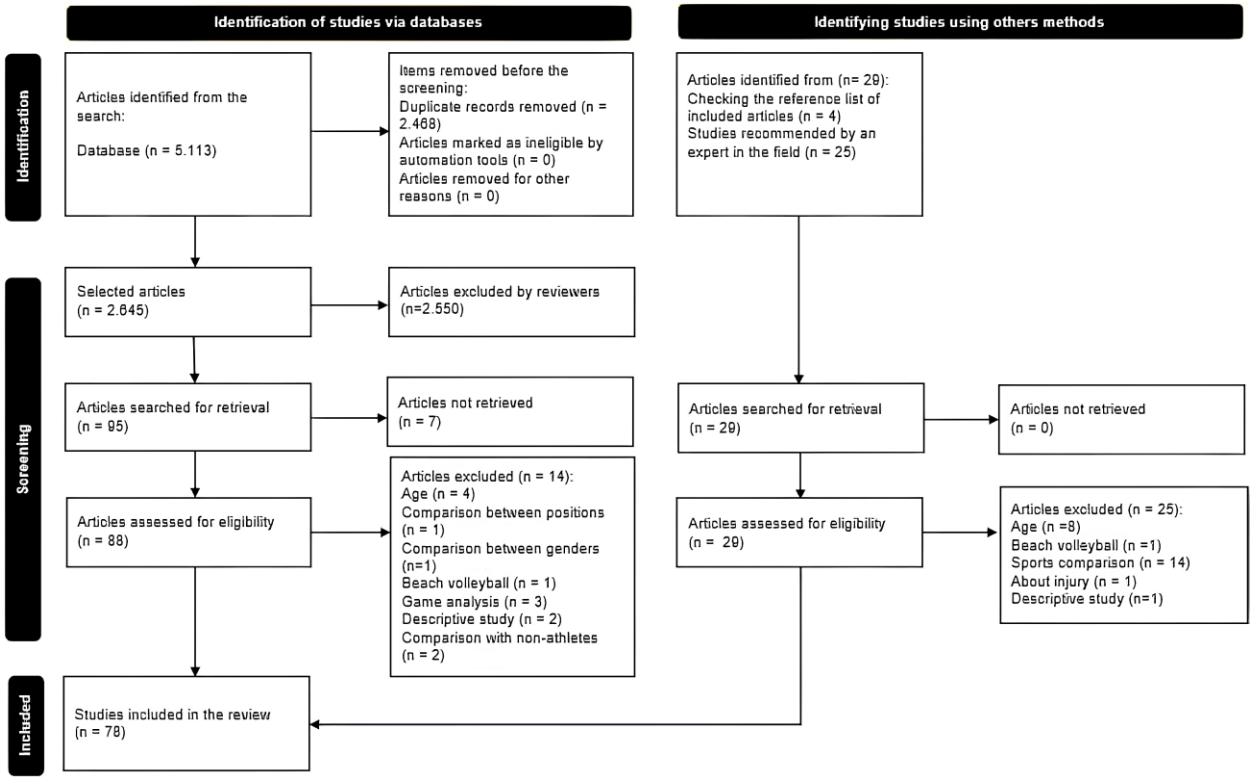

Figure 1. Flowchart: number of reports collected and the number of eligible studies after the screening process.

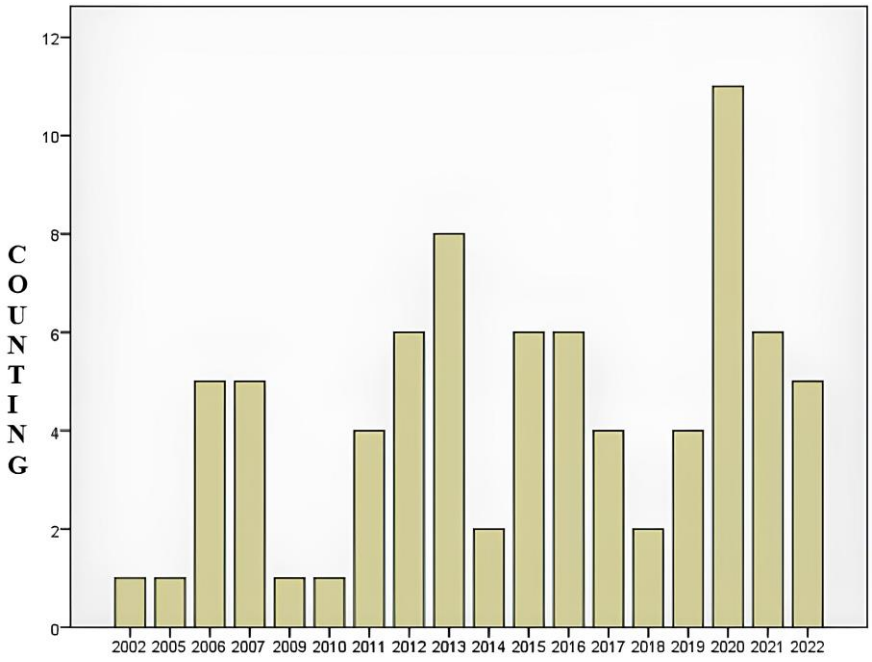

Figure 2. Number of studies by year of publication.

According to Table 1, 56.4% of the studies used samples made up of females, followed by both sexes (17.9%), and finally by males (16.7%). In relation to the age of the sample, the majority of the studies

evaluated adolescent athletes - 12 to 17 years old (57.7%), followed by those that evaluated both adolescents and adults (33.3%), and just 9% evaluated only adults (these are the ones that evaluated the passage of the career/retrospective of the athlete).

In terms of skill level, some of the studies evaluated athletes of different abilities (32.1%), followed by advanced (national level, 29.5%), intermediate (state level, 12.8%), basic (regional/local level, 10.3%), and specialists and novices (international level and inconsistent level, respectively, each with 3.8%). Additionally, athletes from 22 countries were represented in the studies analysed, with Brazil, Croatia and Spain having the highest number of studies (11.5% each), followed by Portugal (10.3%). In terms of sample size, 57.7% of the studies had a sample size of 20-100 athletes.

Table 1. Descriptive statistics for gender, age, skill level and sample size for the study samples with volleyball athletes.

	N (%)
Sex	
Masculine	13 (16.7%)
Feminine	44 (56.4%)
Mixed	14 (17.9%)
Not reported	7 (9%)
Age	
Adolescent: 12-17	45 (57.7%)
Adult: +18	7 (9%)
Mixed	26 (33.3%)
Level of ability	
Specialist	3 (3.8%)
Advanced	23 (29.5%)
Intermediate	10 (12.8%)
Basic	8 (10.3%)
Novice	3 (3.8%)
Mixed	25 (32.1%)
Not reported	6 (7.7%)
Sample size	
<20	7 (9%)
20-50	26 (33.3%)
51-100	19 (24.4%)
101-200	13 (16.6%)
201-500	8 (10.3%)
501+	5 (6.4%)

In Table 2, there is a higher percentage of cross-sectional studies (85.9%), followed by retrospective/longitudinal studies (11.5%) and short-tracking studies (2.6%). In relation to the studies that compared groups, it was observed that some compared age categories (26.9%), and others compared athletes of different performance levels, covering a wide range of terms such as: elite vs sub-elite (9%), more skilled vs less skilled (7.7%), more experienced vs less experienced (6.4%). Regarding the data analysis, a significant proportion of the studies adopted the bivariate analysis (66.7%), followed by the multivariate analysis (30.8%) and few qualitative analyses (2.6%). As far as the type of data collection, most of the studies used a battery of tests (91%), followed by interviews with athletes (7.7%) and, lastly, a database/secondary source (1.3%).

Table 2. Characteristics of the study project.

	N (%)
Study design	
Cross-sectional	67 (85.9%)
Retrospective / longitudinal	9 (11.5%)
Intervention / short-tracking	2 (2.6%)
Division into groups	
Successful vs unsuccessful	6 (7.7%)
Age categories	21 (26.9%)
Technical performance	1 (1.3%)
Elite vs Sub-elite	7 (9%)
More experienced vs less experienced	5 (6.4%)
Most skilled vs least skilled	6 (7.7%)
Ranking	3 (3.8%)
National team vs other	3 (3.8%)
Selected vs not selected	4 (5.1%)
Starters reserve	1 (1.3%)
Not applicable	21 (26.9%)
Data analysis	
Bivariate analysis	52 (66.7%)
Multivariate analysis	24 (30.8%)
Qualitative analysis	2 (2.6%)
Type of data collection	
Battery of tests	71 (91%)
Secundary source database	1 (1.3%)
Interview with athletes	6 (7.7%)

Note: Bivariate analysis (T-test, X^2 test, Correlation, Intraclass Correlation, ANOVA, ANCOVA, Kruskal Wallis test, Mann-Whitney U test); Multivariate analysis (Linear Regression, Multiple Linear Regression, Canonical Correlation, Discriminant Analysis, Factor Analysis).

Table 3 demonstrates which are the indicators of sporting talent in volleyball most utilized in research. Among those restricted to the individual, anthropometric and physical-motor characteristics are the most used (62.8% and 56.4%, respectively). However, the psychological abilities were the indicator least analysed by the studies (7.7%). With regards to the indicator restricted to the task, 52.6% of the research studies used the quantity/quality of practice and/or training characteristics, and most of the time this indicator was used to characterize the sample. Lastly, those restricted to the environment, despite the subjective assessment of the coach being the most used among the research, only 20 studies out of the 78 analysed by this study utilized the perspective of the coach.

Table 3. Characteristics according to the types of variables analysed.

	N (%)
Individual restrictions	
Anthropometric characteristics	49 (62.8%)
Physical-motor characteristics	44 (56.4%)
Technical skills	17 (21.8%)
Tactical/cognitive skills	23 (29.5%)
Maturation	7 (9%)
Motor coordination	7 (9%)
Psychological abilities	6 (7.7%)
Task constraints	
Quantity/quality of practice/training	41 (52.6%)
Environmental constraints	
Socio-cultural characteristics	4 (5.1%)
Subjective evaluation by the coach	20 (25.6%)
Performance in competitions	14 (17.9%)

In addition, of the 78 articles analysed, only 16 (20.5%) adopted a multidimensional approach, i.e., they evaluated four or more indicators within sporting talent. In relation to the division of studies in terms of the approach adopted, the majority of studies utilized group comparisons (60.3%), followed by performance prediction (28.2%) and with little research into predicting the future success/progression in the career of the athlete (11.5%).

Table 4 presents the results of the articles on the group division, performance prediction and career progression, classified as positive, contradictory and negative. Regarding the group division studies, the variables of motor coordination, maturation and sociocultural characteristics were not used. There was a balance between positive, contradictory and negative results for the anthropometric indicator, while for the physical-motor, technical skill and psychological indicators the results were mainly positive and contradictory, with few negative ones.

Moreover, in the variable tactical/cognitive skills, quantity/quality of practice/training and subjective evaluation by the coach, there was a higher concentration of positive results compared to the others. Hence, for the performance in competitions, there was a balance between positive and negative results. For the performance prediction studies in almost all of the variables analysed, except quantity/quality of practice, there was an over-representation of the positive results in relation to negative ones. In relation to the career progression studies, there was a balance between positive and negative results for the anthropometric and physical-motor indicators and a greater concentration of positive results for the indicators: quantity/quality of practice/training, subjective assessment of the coach and, above all, for maturation and motor coordination, for which the results were 100% positive.

Table 4. Distribution of indicator results to group division, performance prediction and career path studies.

	Division of groups			**Performance prediction**		**Career progression**	
	Positive	Contradictory	Negative	Positive	Negative	Positive	Negative
Restricted to the individual							
Anthropometric characteristics	11 (35.6%)	10 (32.2%)	10 (32.2%)	7 (77.7%)	2 (22.3%)	1 (50%)	1 (50%)
Physical-motor characteristics	12 (41.4%)	11 (37.9%)	6 (20.7%)	14 (93.3%)	1 (6.7%)	1 (50%)	1 (50%)
Technical skills	5 (41.7%)	5 (41.7%)	2 (16.6%)	3 (75%)	1 (25%)	0 (0%)	0 (0%)
Tactical/cognitive skills	8 (57.1%)	5 (35.7%)	1 (7.2%)	8 (88.9%)	1 (11.1%)	0 (0%)	0 (0%)
Maturation	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	1 (100%)	0 (0%)
Motor coordination	0 (0%)	0 (0%)	0 (0%)	4 (100%)	0 (0%)	2 (100%)	0 (0%)
Psychological skills	2 (40%)	3 (60%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)
Restricted to the task							
Quantity/quality of practice/training	7 (70%)	1 (10%)	2 (20%)	1 (50%)	1 (50%)	3 (60%)	2 (40%)
Restricted to the environment							
Socio-cultural characteristics	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	2 (100%)	0 (0%)
Subjective evaluation of the coach	10 (83.3%)	2 (16.7%)	0 (0%)	4 (100%)	0 (0%)	2 (66.6%)	1 (33.4%)
Performance in competitions	3 (60%)	0 (0%)	2 (40%)	6 (85.7%)	1 (14.3%)	0 (0%)	0 (0%)

DISCUSSION

The objectives of this research were to investigate studies in the current literature on the area of sporting talent in volleyball, as well as to critically analyse what else has been researched on the subject, identify gaps and encourage new research. The results found demonstrate that there has been a significant increase in research publications in the field, especially in the last 10 years and with an greater emphasis in the last 2 years.

Most of the studies analysed adolescent female athletes at national level (intermediate), with samples ranging from 20 to 100 individuals, with a cross-sectional design, bivariate analysis and the application of test

batteries. Among the most commonly assessed indicators were anthropometric and physical-motor characteristics, and more than half of the studies used comparisons between groups, with a large variety of terms (age categories, successful *vs.* unsuccessful, elite *vs*. sub-elite, among others). In addition, athletes from Brazil, Croatia and Spain were the most represented in this study.

Concerning the results found by the studies, the studies that compared groups had a balance between positive, contradictory and negative results for anthropometric characteristics, while for physical-motor indicators, technical and psychological skills there was a balance between positive and contradictory results, the latter being greater than the negative ones. In addition, there was a higher concentration of positive results compared to the others for the indicators tactical/cognitive skills, quantity/quality of practice/training and the subjective evaluation of the coach. Only the variable performance in competition showed a balance between positive and negative results. In regards to the performance prediction studies, there was an over-representation of positive results in relation to negative results for almost all the variables, except quantity/quality of practice/training, which showed a balance between positive and negative. The studies aimed at predicting future success/career progression that used anthropometric and physical-motor indicators had balanced positive and negative results. However, the indicators of motor coordination, sociocultural characteristics and maturation had 100% positive results. The indicators of subjective assessment of the coach and quantity/quality of practice/training had slightly more positive results than negative ones.

Regarding the gaps identified, there have been studies with samples of male athletes, international level (experts) and beginners (novices), longitudinal and retrospective studies, multivariate and qualitative analysis. Also, there has been little research evaluating psychological skills and few have used the subjective analysis of the coach. Another shortcoming are studies that adopted multidimensional analysis (those that assessed at least 4 indicators), and that took the approach of predicting future success/career progression. Furthermore, there were scarce studies both comparing groups and predicting performance that evaluated the indicators of psychological skills, motor coordination, sociocultural characteristics and maturation. And for studies predicting future success/career progression, the indicators of technical, tactical/cognitive, psychological skills and performance in competitions were the least analysed.

The present research analysed 78 articles about sports talent in volleyball between 2000 and 2022. It was found that in the first 10 years (2000 to 2009), the growth in publications was slow, and from 2010 onwards the number of studies began to grow rapidly. It is noteworthy that in the 4-year period from 2015 to 2019 there were 28.2% of studies included and in the last 2.5 years (2020 to mid-2022) there were also 28.2% of research included. This demonstrates that the area of sporting talent in volleyball has aroused the interest of the academic community, converging with the scoping review undertaken by Baker et al. (2020), in which they synthesized articles from the area of sporting talent encompassing various sports between the years 1990 to 2018.

Surprisingly, it was found that the female sex is more represented in the research on talent in volleyball, not corroborating what has been found in the literature on sporting talent. The review by Curran et al. (2019) analysed 276 articles on sporting talent and only 9.42% of them were on the female gender. Thus, although there is a certain scarcity of male studies of sporting potential in volleyball, women/girls have achieved an important prominence within volleyball. This result is probably due to the fact that female volleyball has gained worldwide prominence, which may have stimulated the development of research focused on this gender.

Furthermore, another relevant fact of this research is that, even though the inclusion criteria were only English-language articles, Brazil is among the 24 countries found that have published the most on sporting talent in volleyball, tied with Spain (11.5%) and higher than Portugal (10.3%). Probably, this result is due to the fact that Brazil is considered a world reference in volleyball, whether male or female, which may encourage Brazilian researchers to delve deeper into this area of knowledge and become a world reference in the academic world as well, when it comes to sporting talent in volleyball.

In relation to the age of the sample, more than half of the studies analysed adolescents, 33.3% both adolescents and adults (comparison by age group), and only 9% adult athletes (retrospective). This result was to be expected, given that one of the inclusion criteria is for studies involving a sample under the age of 18, with the exception of retrospective studies (which evaluated the career of the adult athlete). Therefore, it cannot be said that there is a shortage of research on athletes over 18. This is also true for studies with a short-tracking/intervention design, since one of the exclusion criteria are studies focused on the effect of training, which are mostly short-tracking.

However, a large disparity was observed between retrospective/longitudinal studies (11.5%) and cross-sectional studies (85.9%). This result is in accordance with the narrative review conducted by Barraclough et al. (2022), which assessed the reality of studies on sports talent in team sports in relation to methodological approaches. The researchers analysed that most studies on sporting talent are cross-sectional due to the ease of assessing athletes at a single point in time.

Despite, longitudinal and retrospective studies, on the other hand, are scarce because they are more labour-intensive (the former constantly dealing with dropout), since they contribute to assessing the long-term development of the athlete and the predictive value of aspects relating to performance, respectively. Unfortunately, cross-sectional studies are at odds with the fact that sporting talent is non-linear (Roberts et al., 2019), in which case, the characteristics change during the development process of the athlete. In other words, if an athlete possesses an excellent trait at a given time, this does not mean that this athlete will be successful in the future.

Regarding the type of analysis carried out by the studies, 66.7% used bivariate analysis, 30.8% multivariate analysis and only 2.6% qualitative analysis. According to Massa et al. (1999), bivariate analysis is that which relates variable by variable, however, it does not analyse the possible relationships between different variables and does not relate the importance of each variable in the period analysed. These two components are present in multivariate analysis, which can be seen as the most appropriate when analysing sports talent variables, because for an athlete to reach a high level (which is considered to be sports talent) there needs to be interaction between different factors, whether individual or environmental (Paula et al., 2021). In this way, it is recommended that future research into sporting talent be mindful of adopting multivariate analysis.

Additionally, only 20.5% (16 studies) were considered multidimensional, i.e., those that assessed at least 4 indicators of sporting talent. This reality contrasts with what is already known about sporting talent, which is considered multidimensional (Issurin, 2017), indicating a need to adjust research in this area. The systematic review by Piggott et al. (2019) analysed sports science research in the literature, including studies on sports talent, and the researchers reinforced the need for and importance of conducting research that links various sports science subdisciplines (such as physiological fitness, cognitive-motor ability, physical performance) to assess sports talent. Thus, even with research consolidating the multidimensional approach to talent, there are still few studies that have adopted this perspective.

Another important result is that the studies were divided into three categories: group comparison (60.3%), performance prediction (28.2%) and prediction of future success/career progression (11.5%). It can be seen that most of the studies focus on comparing groups, either by age group (26.9%) or by different levels of performance with distinct terminologies: elite vs sub-elite (9%), more skilled vs less skilled (7.7%), successful vs unsuccessful (7.7%), more experienced vs less experienced (6.4%), among others. Thus, although a variety of terms used in the literature is to be expected, perhaps this reality is due to the fact that there is still no clear concept of talent (Baker et al., 2019), which is influenced by its level of performance, since the experienced/expert athlete is the one who has reached the international level, therefore, he or she is the sporting talent.

In addition, in relation to the type of data collection, 91% of the studies included used batteries of tests, which are considered to be one of the best ways of identifying the determining indicators for high-level sport. Among the variables analysed by the studies, anthropometric characteristics (62.8%) and physical-motor characteristics (56.4%) were the ones that were covered most in the literature. This was to be expected, considering it has already been consolidated that high performance in volleyball requires the athlete to present, for example, high values for height and wingspan (Noori & Sadeghi, 2018), upper and lower limb strength (both important for the fundamentals of the sport and for vertical jumps) (Sarvestan et al., 2020; Tsoukos et al., 2019). The variable quality/quantity of practice/training (52.6%) was also widely utilized in the researches, since most of the studies which compared groups, compared athletes of different skill levels, in which the length of experience (quantity of practice) was employed (Castro et al., 2020; Gil et al., 2012).

Another important result of this study is that, although the importance of anthropometric indicators in the performance of volleyball athletes is well-established in the literature, there is a balance between positive, contradictory and negative results in studies comparing groups. This result may be due to the fact that the studies comparing different age groups (26.9%) were very heterogeneous in relation to the categories analysed, for example, the study by Majstorovic et al. (2020) which compared volleyball athletes from the U15, U17, U19 and U21 categories and the study by Cherouveim et al. (2020) that compared athletes born in 2006 and 2007. The first study found positive results in anthropometric indicators, given that the chronological age interval between the groups is much greater than the second study, which presented negative results. It is therefore expected that with the influence of maturation, the greater the difference in age, the greater the difference in some anthropometric indicators (Albaladejo-Saura et al., 2022). However, despite being able to construct this relationship in terms of the number of age categories that were compared, the reason for this balance between positive, contradictory and negative results for anthropometric indicators is still unclear.

The tactical/cognitive skill variable presented itself with less frequency in the literature (29.5%). This may be due to the difficulty in measuring decision-making, which has been shown to be a determining factor in volleyball performance (Afonso et al., 2012; Claver et al., 2016), which requires the athlete to choose the best decision in the shortest possible time, due to the dynamic and unpredictable nature of this modality. On the other hand, technical skills (21.8%) and performance in competitions (17.9%) were less analysed compared to the others already mentioned. Perhaps these indicators were given less prominence due to our exclusion criteria: studies that only evaluated match performance analysis. Therefore, we cannot affirm that there is a need for more research using these two indicators.

On the other hand, the subjective evaluation of the coach was used by 20 (25.6%) of the 78 articles included. This result shows that there is still little research that considers the opinion of the coach, considering that previous studies have demonstrated that the coach plays a fundamental role in the long-term training process

of the athlete, as this agent is a determinant in the detection of talented athletes, since they can identify characteristics that test batteries cannot measure. This ability of the coach is based on their instinct through their professional experience (Roberts et al., 2019). One result of this research that corroborates this perspective is that 83.3% of the group comparison studies, 100% of the performance prediction studies and 66.6% of the career transition studies found positive results in the subjective evaluation of the coach, thus demonstrating that the coach has a high capacity to detect talented athletes.

Moreover, maturation (9%) and motor coordination (9%) were rarely addressed in the studies. This result needs to be analysed, since the maturation directly influences indicators such as height and muscle strength (Albaladejo-Saura et al., 2022), which are determinants in volleyball. In this way, an athlete with advanced (early) maturation can be seen as a sporting talent, while a late athlete can be "*left out*" in the talent identification process. Moreover, motor coordination, despite being trainable, has a great influence especially in the early years of long-term training, since it allows the athlete, at the beginning of their career, to master the technical fundamentals more easily (Stamm et al., 2005), in addition to already being positively related with the performance in the modality (Karalić et al., 2016).

In relation to the indicators of psychological skills (7.7%) and sociocultural characteristics (5.1%), these were the least studied. Among the psychological skills, although there is little research, it has already been consolidated in the literature that motivation, the resistance of the athlete in dealing with the pressure of training and competitions, and goal setting are determinants for performance in volleyball and maintenance of the athlete in the elite (Issurin, 2017; Milavić et al., 2013; Rabaz et al., 2015). Among the sociocultural characteristics is the support of the parents and coaches in the career trajectory of the athlete, as the retrospective study by Coutinho et al. (2021), analysed qualified and less qualified athletes, and the researchers concluded that those with higher qualification had parents with a moderate involvement in the sport and provided autonomy, and had demanding coaches who provided quality training compared to the less qualified group. Although psychological skills and sociocultural characteristics are important in athlete development, it seems that both are seen as secondary by the academic community, with anthropometric and physical-motor indicators seen as the main determinants of sporting talent in volleyball.

Another important result is that the performance prediction studies (28.2%) presented 75% or more positive results for practically all the variables (except quantity/quality of practice/training). This result demonstrates how each variable plays a fundamental and unique role in the performance of the talented volleyball athlete, thus showing that volleyball is multidimensional. In other words, in order to achieve high performance in the sport, it is necessary for indicators, whether restricted to the individual or the environment, to correlate positively with performance.

In addition, although this study brings important considerations about sporting talent in volleyball, it is subject to certain limitations, including, due to the exclusion criteria, the failure to address some important issues in the area of sporting talent in volleyball, including the effect of relative age (Rubajczyk & Rokita, 2020), and studies that interviewed and/or investigated the opinion of coaches (Milistetd et al., 2013). Another limitation is the fact that we only analysed studies in English, which made it impossible to include articles on talent from other languages, which could have contributed to our discussion. In addition, this research did not analyse the different definitions of talent provided by the studies, since according to Baker et al. (2019), there is still no complete clarity about the complexity of the definition of sporting talent. Finally, this study did not analyse the quality of the articles included, as some of them, for example, did not state the gender (9%) and skill level (7.7%) of the sample, which could provide a more accurate analysis of the current literature.

It is therefore recommended that new studies carry out a literature review in order to analyse the current definition of sporting talent. Another recommendation is for new studies to adopt a longitudinal or retrospective design, with multivariate analysis, developing relationships with various indicators (i.e., multidimensional), focusing on variables that are little studied in the literature, such as psychological skills, subjective evaluation by the coach, biological maturation, motor coordination and sociocultural characteristics, without neglecting the other indicators.

CONCLUSION

It can be concluded from the analysis of the 78 articles included that the area of volleyball sporting talent has grown in recent years and focuses on cross-sectional research, with bivariate analysis, comparison of groups, with batteries of tests and the female gender having greater relevance. However, there are only a few studies that employ a multidimensional approach, with a retrospective/longitudinal design, multivariate analysis and which used the male gender. Furthermore, the main indicators used were anthropometric and physical-motor characteristics, with psychological abilities, biological maturation, motor coordination and sociocultural characteristics as the indicators least studied in the literature. Although the subjective assessment of the coach is not the least important, it should be further developed in future research, as well as the less analysed indicators using a multidimensional approach.

AUTHOR CONTRIBUTIONS

Júlia Ribeiro de Oliveira, Francisco Zacaron Werneck and Mauricio Gattas Bara Filho designed the manuscript, actively participated in decisions related to the inclusion of studies and interpreted the results. Francisco Zacaron Werneck and Mauricio Gattas Bara Filho systematically guided Júlia Ribeiro de Oliveira during the article writing process, reviewed the manuscript and contributed technically to the quality of the manuscript. Júlia Ribeiro de Oliveira wrote the draft of the manuscript, conducted the literature search and data collection. Francisco Zacaron Werneck performed the statistical analysis and manuscript review. Mauricio Gattas Bara Filho supervised the study and review of the final version. All authors contributed to the creation of this manuscript, involved in the extensive article review, and reviewed versions of the final manuscript prior to submission.

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