

# **A systematic review of female badminton talent identification: Implications for development**

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## **ABSTRACT**

This study aimed to systematically review female badminton talent identification methods and their implications for athlete development. The review analysed literature on talent identification criteria, including physiological, psychological, and social factors. The materials used were articles published in international journals from various databases such as Scopus, PubMed, and Web of Science. The methodology of this study utilised a systematic review approach based on the PRISMA guidelines. This review's main findings indicate that identifying female badminton talent involves a multidimensional assessment, which includes physical measurements such as strength and agility, psychological aspects such as motivation and mental toughness, as well as social factors such as family support and access to training. However, research shows gaps in gender-sensitive approaches and limitations of research in developing countries. The practical implication of these findings is the importance of developing more specific talent identification methods for women, taking into account physiological and psychological differences relative to men. This study concludes that despite significant efforts in talent identification, more research is needed to develop more accurate and applicable tools for female badminton athletes and expand the scope of future research.

## **KEYWORDS**

Talent Identification; Women's Badminton; Systematic Review; Athlete Development

## **1. INTRODUCTION**

Talent identification is important in sports, particularly badminton, which demands physical, mental, and social abilities. In the context of female badminton, this process becomes even more significant due to gender differences that affect athletes' physiological, psychological, and social performance. Previous research shows that the distribution of muscle mass, hormone levels, and physiological conditions of women are different from that of men, so an extraordinary approach is needed in their talent identification (Edmizal et al., 2023).

Female participation in badminton has continued to increase in recent decades. Based on the Badminton World Federation (BWF) report, the number of female athletes involved in the sport is increasing at both amateur and professional levels. However, the talent identification methods used still rely on generic approaches that do not fully address the specific needs of women. This results in many potential female talents not being optimally detected, especially in developing countries with limited resources (Ping et al., 2024).

Gender differences also pose unique challenges in the talent identification process. Physiological aspects such as muscle strength, endurance, and body composition of women differ from men's, affecting the ability to play badminton. In addition, psychological dimensions, such as motivation, self-confidence, and competitive mentality, also play an important role. Social factors, such as family support, gender stigma, and access to training facilities, also influence the potential of female athletes. Previous research has suggested that social stereotypes and cultural constraints often prevent women from participating in sports to their full potential (Gasibat et al., 2023).

Despite these studies, there are several problems with the existing literature. First, many talent identification methods are designed for men and are not tailored to the needs of women. Secondly, the measurement tools used often ignore psychological and social dimensions, which play a significant role in the development of female athletes. Third, most studies are still limited to developed countries, thus not reflecting conditions in developing countries with limited sports facilities and support (Sharma, 2023).

This research aims to review the literature relating to female badminton talent identification systematically. Through this approach, the research seeks to identify trends, methods, and results from relevant studies and provide practical recommendations for coaches, experts, and sports policymakers. As such, this research is expected to contribute to developing a more inclusive and effective talent identification system.

Theoretically, this research enriches literature in women's sports, especially badminton. This research also guides coaches and sports organizations in choosing more relevant and specific talent identification methods for women. Practically, the study's results can be used to design training programs tailored to female athletes' physiological, psychological, and social needs (Afifi et al., 2020; Gasibat et al., 2023).

Through a systematic observation approach, this study not only describes the current state of the literature but also provides recommendations for future strategies to improve the talent identification system. With an understanding of previous research, this article is expected to be a valuable reference for academics, practitioners, and policymakers in sports.

## **1.1. LITERATURE REVIEW**

### **1.1.1. Talent Identification in Women's Badminton**

#### ***Physiological Factors***

Badminton, a sport that prioritizes speed, agility, and endurance, requires athletes with optimal physical condition. Strength and endurance are two important factors that are key indicators of talent development. Muscle strength, especially in the lower and upper body muscles, allows athletes to produce robust and powerful strokes. For example, a study by Fu et al. (2021) found that increasing muscle strength can significantly improve the performance of female badminton athletes in various aspects of the game, such as power smash and endurance when playing long games.

In addition, cardiovascular endurance is an important factor in maintaining badminton performance, and it often lasts more than an hour (Rusdiana et al., 2023). It was shown that badminton athletes with high aerobic capacity have an advantage in physical endurance, which affects stamina during matches.

Besides strength and endurance, agility and speed are two other factors that are very important in talent identification. The ability to move quickly and with high agility allows athletes to respond appropriately to opponents' movements. Research by Dong et al. (2019) highlighted that athletes with fast movement speed and sharp reaction ability can better dominate the game. In addition, in badminton games, lateral movements and rapid changes in direction significantly affect athletes' effectiveness in defence and attack.

Flexibility is also an important factor that is often overlooked in the development of female badminton talent. Optimal flexibility helps athletes prevent injuries and allows for more efficient

execution of specific techniques, such as performing overhead movements or more powerful smashes (Gill et al., 2021) state that sports that involve a lot of explosive movements and shifts in body position require a high level of starters to reduce the risk of injury and support optimal movement distance.

Finally, coordination and balance also play an important role in badminton. Well-coordinated movements allow athletes to move their bodies effectively and adjust positions quickly to respond to the ball. Research by Shapie et al. (2023) shows that athletes with a better level of balance can execute hitting techniques with more precision and more efficiently recover position after performing dynamic movements. Thus, physiological factors that include strength, endurance, agility, stiffness, coordination, and balance are decisive in identifying female badminton talent. The above studies support the importance of a comprehensive evaluation of these physical components in assessing an athlete's potential.

### ***Psychological Factors***

Psychological factors play a vital role in the success of a badminton athlete, especially in identifying talent and developing their potential. Mental toughness or mental resilience is one of the key components required. Athletes with mental toughness can cope with pressure in high competition, maintain focus, and stay motivated despite failure or challenges. A study by Hidayat et al. (2023) showed that mental toughness is closely related to athletes' performance in sports that require high physical and psychological endurance, such as badminton.

In addition, motivation and determination (determination) are also very decisive. Female athletes with intrinsic motivation tend to be more committed to training and more resilient to pressure. Their motivation theory states that intrinsic motivation contributes significantly to long-term achievement in sports (Gómez-Ruano et al., 2020).

The ability to stay focused in stressful situations is also essential. Concentration is a psychological aspect that distinguishes high-performing athletes from others. According to Heydari et al. (2018), athletes who maintain high concentration during matches can avoid external distractions and make better strategy decisions. Overall, developing female badminton talent requires an approach that considers these psychological factors to increase their chances of success in high-level competition.

## ***Social Factors***

Family support plays a vital role in the development of athletes, especially for female athletes. The presence of a supportive family can increase an athlete's confidence and motivation to continue practising and competing. In badminton, parents who are active in providing facilities and time for training can significantly contribute to athlete achievement (Saltzman et al., 2020). In addition, supportive communities such as peers or coaches who have a deep understanding also help to create a supportive environment for talent growth (Beni et al., 2017).

Access to adequate training and facilities is highly influential in identifying female athlete talent. Without access to good facilities and competent coaches, many talents are overlooked. Studies show that structured training programs and adequate facilities improve athlete performance.

### **1.1.2. Research Trends Related to Talent Identification**

#### ***Methods Used in Talent identification***

Research on talent identification in badminton often uses various physical tests to assess athletes' abilities. Tests such as the shuttle run, vertical jump test, and 20-meter sprint test are widely used to measure agility, speed, and endurance (Malwanage et al., 2022; Rusdiana et al., 2023; Sharma, 2023). Assessment of these physical components is crucial as speed and agility are key factors in badminton performance.

In addition to physical tests, studies have also relied on technical observation to assess athletes' technical abilities performing basic badminton movements, such as footwork, strokes, and strategic movements (Sobko & Sobko, 2022). This observation method allows coaches and researchers to identify techniques not seen in pure physical tests. Equally important, psychological tests are also used to measure mental factors such as mental toughness and athlete motivation. Research shows that psychological factors such as mental resilience greatly influence performance in competitive sports, including badminton (Akbar et al., 2024). Overall, the combination of physical tests, technical observations, and psychological tests provides a more comprehensive picture of the talent of female badminton athletes.

#### ***Population and Sample in Talent Identification Research***

Research on talent identification in women's badminton often involves various age groups, from adolescents to professional athletes. Research on young age groups often aims to detect potential talent early, hoping to develop them into elite athletes (Ping et al., 2024). For example,

many studies select adolescent athletes (12-18 years old) because their physical and psychological abilities begin to show signs of development relevant to sports performance.

In addition, some studies also include senior athletes who have competed at the national or international level to generate linkages between identified talent indicators and high-level achievement (Li et al., 2022). These populations are important for assessing the effectiveness of identification methods used to select gifted athletes at a young age and comparing them with already accomplished athletes.

Sample selection in research also dramatically affects the generalizability of results. Many research samples are limited to those that do not include geography and socio-economics, which may affect the results (Ping et al., 2024). Therefore, further studies in developing countries or with more diverse populations are needed to ensure the fitness and effectiveness of talent identification methods.

### **1.1.3. Research Gaps Found**

#### ***Study Limitations in Female Athletes***

Research on talent identification in female athletes is still limited compared to men. Most existing studies focus more on the male athlete population or do not distinguish gender differences in talent identification. Studies that include female athletes often only address physical aspects without considering psychological and social factors that also play an important role in their performance (Singh & Parmar, 2016).

In addition, many studies use small or underrepresentative samples of diverse female athletes. This lack of sample variation limits the generalizability of research findings to broader populations, especially in developing country contexts where access to training and facilities may be limited (Lassandro et al., 2021). This suggests the need for more research that addresses the specific needs of women in sports talent development..

#### ***Lack of Research in Developing Countries***

Research on female badminton talent identification has primarily been conducted in developed countries, while relevant research for developing countries is limited. This has resulted in an incomplete understanding of the social, cultural and economic factors that influence the talent development of female athletes in developing countries. Many studies ignore the conditions that exist in countries with limited resources, which may ultimately affect the implementation of effective

talent identification models (Zhang & Leng, 2023).

In addition, differences in training infrastructure and access to better facilities lead to disparities in the talent identification process between developed and developing countries. These limitations make it difficult for coaches and sports organizations to identify and develop hidden talents in less-developed communities (Ping et al., 2024). Research in developing countries is critical to creating a more inclusive and sustainable system in sport, considering the unique challenges female athletes face in these countries.

### ***Inadequate Development of Measuring Tools***

One of the main gaps in identifying female badminton talent is the limited measurement tools that can holistically assess the various aspects that support athlete development. Most existing instruments only focus on physical components, such as strength and agility, without considering capable psychological and social factors. Considering biological and psychosocial differences, measuring instruments designed specifically for women are still rare (Hambali et al., 2020).

In addition, the lack of universal standards in the development of measuring instruments makes the results of talent identification challenging to compare between studies or apply across different contexts. For example, agility tests used in developed countries may be less relevant in developing countries due to differences in facilities and methodologies (Loureiro & de Freitas, 2016).

Instruments have also not widely integrated modern technologies, such as motion sensors or internet-of-things-based analytics, to improve accuracy and efficiency. Such technologies can help identify hidden potentials that are difficult to measure with conventional methods (Williyanto et al., 2023). Therefore, innovation is needed to develop a comprehensive, valid, and reliable measurement tool to improve the identification of female badminton talent.

### **1.1.4. Implementation of Talent Identification Theory and Practice**

#### ***Talent Development Model in Women's Badminton***

Talent development in women's badminton requires an approach that includes physical, psychological, social and environmental aspects. One frequently used model is the multidimensional approach, which emphasizes that talent depends not only on physical factors but is also influenced by psychological characteristics such as mental toughness and intrinsic motivation (Murata et al., 2023).

The model also suggests environment-based talent identification that considers athletes'

access to facilities, coaches, and social support from family or sporting community (Kyrousi et al., 2016). In the context of women, the model highlights the importance of designing programs responsive to gender needs, such as paying attention to hormonal balance and, more specifically, stress management. In addition, skill-based training programs that combine technical analysis with physiological evaluation have proven effective in identifying the potential of young athletes. This strategy allows coaches to adapt teaching methods based on individual strengths and specific development needs (Curvey et al., 2023).

Models such as the Talent Development Environment Questionnaire (TDEQ) can also be used to measure the effectiveness of talent development programs by considering the prospects of coaches and athletes (Thomas et al., 2020).

### ***Coach's Role in Talent Identification***

Coaches play a central role in the talent identification process of female athletes, primarily through direct observation of the athlete's physical, technical and mental abilities. A competent coach can recognize potential through basic analytical skills such as agility, strength, and coordination of movements relevant to badminton. This identification is usually done through standardized performance tests, such as shuttle runs and vertical jumps, which have proven effective in measuring the potential of young athletes (Abián-Vicén et al., 2021).

In addition to physical abilities, coaches also play a role in psychological aspects such as motivation, mental toughness, and the ability to manage pressure. This factor becomes important in high-level competition, as mental endurance is often the difference between ordinary and talented athletes (Kyrousi et al., 2016). Coaches can also use psychological interviews and questionnaires to explore athletes' mental characteristics more deeply.

In addition, coaches can create a supportive training environment by paying attention to social aspects, such as building good communication with athletes and their families. Social support has increased athletes' motivation to undergo long-term training (Adirahma et al., 2024). With a holistic approach, coaches can facilitate the optimal development of athletes' potential in terms of physical, technical, and psychological aspects.

### ***Specific Training Program Needs***

Training programs must be specifically designed to meet the unique needs of female athletes, including adjusting training intensity, technique focus, and strategy. This individualized approach is

important because women's physical and psychological factors can differ significantly from men's. For example, programs that consider hormonal considerations can help maximize performance (Fu et al., 2021).

Mental and Psychological Development Training should include mental development components, such as stress management and motivation, which are particularly relevant for female athletes. Coaches should create a supportive environment to overcome psychological barriers, including social pressure and gender stereotypes (Rodríguez-Oramas et al., 2021). Programs like this can improve athletes' mental endurance during competition.

Technical aspects, such as footwork mastery and specialized strokes, require more attention to improve game efficiency. Emphasis on female-specific tactics is also important in dealing with opponents with different physical advantages (Yao & Liang, 2020).

## 2. METHODS

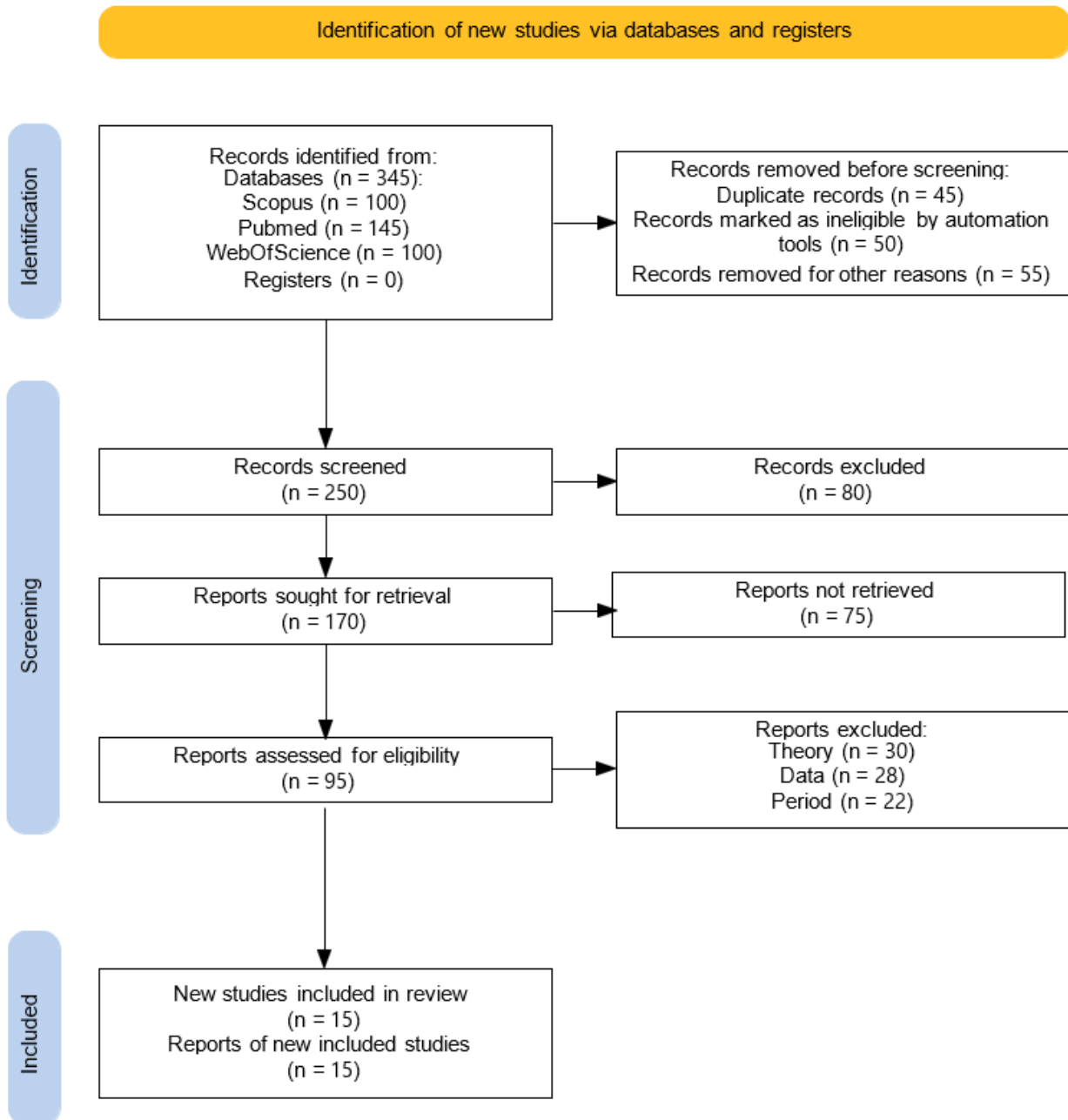
This study used systematic observation to analyze the literature addressing female badminton talent identification. This process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which included data search, selection, and synthesis stages. Data were obtained from electronic databases such as Scopus, PubMed, and Web of Science with keywords such as talent identification, female badminton athletes, and athlete development. We set explicit inclusion and exclusion criteria for article selection (Table 1).

**Table 1.** Inclusion and exclusion criteria

<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
Original study, systematic observation, or meta-analysis relevant to female badminton	Opinions, editorials, anecdotal reports or articles without empirical data.
Focus on talent identification of female athletes in the sport of badminton.	Studies that are not specific to talent identification or do not focus on women.
Female athletes aged from adolescence to early adulthood (12-25).	Non-athlete populations or male athletes.
Valid research methods	Research methods that lack validity
Articles written in English	Articles in other languages without available translations.
Articles published within the last 10 years	Articles published more than 10 years ago.

The process analysis in this systematic review involved several key steps. First, literature was selected by screening articles based on inclusion criteria, such as topic relevance, methodology used, and complete data availability. Second, each article was evaluated using a quality framework, such as

the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method, to ensure the validity and reliability of the results. Third, data extraction was performed by noting the main findings, population, and methods used in each study. Finally, data from the various studies were synthesized using a thematic approach to identify patterns, trends and relationships between factors that support the identification of female badminton talent (Figure 1).



**Figure 1.** The stage of article selection with PRISMA Method

### 3. RESULTS AND DISCUSSION

Table 2 presents the main findings from prior research on female badminton talent identification, highlighting physical, psychological, and social factors.

**Table 2.** Findings on female badminton talent identification

<b>Findings</b>	<b>Keys on findings</b>	<b>References</b>
Physical Dimensions: Agility as a Major Factor	Agility is often considered a key physical factor in the performance of female badminton athletes.	(Kuo et al., 2022; Subarkah et al., 2023)
Psychological Dimension: Mental Resilience	Female athletes with high mental resilience tend to be more consistent in high-level competition.	(Kushwaha & Tyagi, 2023; Watanabe et al., 2011)
Social Dimension: Family Support	Emotional and financial support from family is important in developing talented female athletes.	(Pan et al., 2022; Portela-Pino et al., 2024)
Identification Method: Anthropometric Test	Height, weight and arm length tests are early predictors of female badminton talent.	(Angga, 2019; Phomsoupha & Laffaye, 2014)
Study Population: Adolescent Athletes	Most studies focus on talent identification in the adolescent age group (12-17 years).	(Burgess & Naughton, 2010; Lemoyne et al., 2022; Meyer & Rinn, 2021; Vaeyens et al., 2008)
Lack of Gender-Sensitive Approach	Many talent identification methods do not consider gender differences in physiological and psychological aspects.	(Larkin et al., 2022; Till & Baker, 2020; Zhao et al., 2019)

This systematic review revealed that agility is a significant physical factor in the performance of female badminton athletes, as shown by studies (Kuo et al., 2022; Subarkah et al., 2023). The ability to move quickly and precisely on the court is an important indicator in identifying potential talent. In addition, mental resilience has also been shown to play a significant role (Kushwaha & Tyagi, 2023; Watanabe et al., 2011) noted that athletes with high levels of mental resilience are better able to deal with the pressure of consistently high levels of competition.

Social factors, such as family support, are also an important aspect. Studies (Pan et al., 2022; Portela-Pino et al., 2024) showed that emotional and financial support from family significantly impacted female athletes' success. Regarding methods, Angga (2019) and Phomsoupha & Laffaye (2014) highlighted using anthropometric tests, including height and arm length, as practical early predictive tools.

However, there is a void in gender-sensitive research, as Larkin et al. (2022), Till & Baker (2020), and Zhao et al. (2019) emphasize that many approaches do not consider gender differences in physiological and psychological aspects, which may affect the accuracy of talent identification. This underscores the need for the development of more inclusive methods.

The findings of this systematic review revealed the importance of various dimensions in identifying female badminton talent, specifically physical, psychological and social dimensions. Physical dimensions such as anthropometry and agility were the main predictors of success for female athletes. However, emphasising physical aspects alone is not enough, especially since women often face gender constraints in developing their athletic potential.

The implications of these findings are highly relevant for coaches, sports associations, and academics. Coaches can develop more inclusive, evidence-based training programs to identify and nurture female talent. On the other hand, sports organisations should pay attention to policy aspects that support access and gender equality in sports.

However, there are some limitations to note. Most studies focused on populations in developed countries, so the results may not fully represent conditions in developing countries. In addition, some of the methods adopted by previous studies do not consider cultural dynamics that may affect talent development. Therefore, further research needs to be conducted holistically and more inclusive.

These findings provide valuable insights into identifying female badminton talent and highlight the need for a more diverse and adaptive approach to ensure the continued development of talented athletes.

#### **4. CONCLUSIONS**

This systematic review reveals important findings in female badminton talent identification and its implications for athlete development. Firstly, the female talent identification process requires a multidimensional approach that includes physical, psychological and social aspects. Physical dimensions such as agility, strength, and posture proved to be significant indicators. At the same time, psychological aspects such as motivation and mental endurance also have an important role in supporting performance development.

Secondly, frequently used methods include specific skill tests, anthropometric evaluations, and psychological observations, but often do not fully address gender differences. The review also highlighted research gaps, particularly in developing countries, and the need for more contextualized

and sensitive approaches to the needs of female athletes.

Practical implications of this review include developing comprehensive, evidence-based talent identification programs for women. Coaches and program managers need to utilize these findings to optimize the development of gifted athletes through more targeted interventions.

Future research is recommended to expand geographic coverage, include more diverse populations, and develop talent identification tools that are better adapted to the unique needs of female athletes. This would enable the coaching system to produce more outstanding female athletes at both national and international levels.

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## **AUTHOR CONTRIBUTIONS**

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

## **CONFLICTS OF INTEREST**

The authors declare no conflict of interest.

## **FUNDING**

This research received no external funding.

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