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Talent Identification and Development of Elite Youth Badminton Players: Social, Environmental, Coaching, and Sport Support Factors

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ABSTRACT

This study examined talent identification and development among elite youth badminton players in Singapore, emphasizing social, environmental, coaching, and institutional influences. A retrospective descriptive approach combined surveys, open-ended questionnaires, and focus group discussions with athletes and coaches. Talent development is shaped by family involvement, relative age, school support, coaching quality, competition opportunities, financial assistance, and access to sport science services. Competition and trials were important mechanisms for player identification, while coaching emerged as central developmental support. Challenges were also identified in early specialization, unequal opportunities, and transitions from youth to senior competition. The study highlights the need for an integrated, longitudinal talent-development system involving athletes, families, schools, coaches, sporting organizations, and sport science support.

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1. INTRODUCTION

Talent identification and development are fundamental components of competitive sport because athletic potential must not only be recognized but also supported through appropriate training and developmental opportunities. Talent identification generally concerns the recognition of individuals who demonstrate potential for future sporting performance, whereas talent development involves the longer-term process through which this potential is supported and transformed into higher levels of performance. Interest in developing systematic approaches to these processes has increased as sporting organizations seek more effective ways to recognize and nurture promising young athletes [1, 2]. The development of young athletes cannot, however, be understood solely from their current sporting performance. Athletic development occurs over time and can be influenced by psychological, physical, social, environmental, and developmental factors. Consequently, early performance does not necessarily provide a complete indication of long-term sporting potential. Talent-development systems should therefore consider not only selection but also the conditions and opportunities that allow young athletes to progress through successive stages of development [1, 2]. The timing of talent identification and specialized training is particularly important in youth sport. Early exposure to appropriate training may provide opportunities for skill development, but excessive emphasis on early specialization can also create developmental concerns. Evidence concerning youth athletes indicates that early specialization should be considered carefully because sporting development is a long-term process and early competitive success does not necessarily guarantee successful progression into senior performance [3]. Training and competition during childhood and adolescence must therefore balance sport-specific development with the broader physical and psychological needs of young athletes. Another important consideration is the relative age effect, in which athletes born earlier within an age-group selection year may be disproportionately represented in competitive sport [4]. Chronologically grouped young athletes can differ substantially in physical and biological development, potentially influencing how coaches perceive their sporting potential. More physically mature athletes may receive greater opportunities for selection, competition, and advanced training, reinforcing initial developmental advantages [5]. Relative-age patterns have been reported across different competitive sports [4, 6, 7], indicating that talent identification based primarily on current competitive performance may overlook athletes whose development occurs later. Talent development is also influenced by the environment surrounding the athlete. Family members, schools, coaches, peers, sporting organizations, training facilities, competition opportunities, financial resources, and sport science services can contribute to or constrain an athlete's developmental pathway. Coaching is particularly important because coaches influence training quality, skill development, motivation, competition preparation, and progression through different levels of performance. For young athletes, this support must operate alongside educational responsibilities and developmental transitions.

Badminton provides a particularly relevant context for examining these issues because successful progression requires technical skills, physical development, structured training, competition experience, and sustained support over several developmental stages. Young badminton players may progress from initial participation to specialized training, school competition, elite youth representation, and potentially senior national competition. However, progression through these stages may not be linear. Athletes can experience changes in coaching, educational demands, competitive status, financial requirements, and access to training and sport science services.

In Singapore, understanding this developmental process is particularly important because schools and educational institutions form part of the environment in which young athletes train, compete, and develop. The athletes examined in this study were full-time students and progressed through school-based and elite sporting structures. Talent development in this context should therefore be viewed as an interaction among sporting performance, education, family support, coaching, and institutional opportunities rather than as a selection process based solely on competition results. Despite growing research on talent identification and youth athlete development, there remains a need to understand how these factors interact within specific sports and developmental environments. In particular, limited empirical information is available on how elite youth badminton players in Singapore were introduced to the sport, identified as talented, supported during specialized training, and progressed toward elite youth competition. Understanding these pathways can reveal both supportive factors and potential barriers within existing talent-development practices.

This study therefore examined the talent identification and development of elite youth badminton players in Singapore. Specifically, the study aimed to (i) investigate social and environmental factors associated with opportunities to achieve excellence in badminton, (ii) examine the support services available to players at key stages of development, and (iii) identify opportunities for improving badminton talent-development processes. By examining player characteristics, developmental pathways, relative age, family involvement, coaching, competition, financial support, and sport science services, the study provides preliminary evidence for developing a more integrated approach to youth badminton talent development.

2. LITERATURE REVIEW

2.1. Talent Identification and Talent Development in Youth Sport

Talent identification and talent development are related but distinct processes in youth sport. Talent identification focuses on recognizing athletes who demonstrate potential for future high-level performance, whereas talent development concerns the longer-term process of providing appropriate opportunities, training, and support to convert potential into sustained sporting achievement. Effective systems therefore need to move beyond selecting athletes solely on the basis of current performance and consider how athletes develop over time [1, 2]. Athletic potential during childhood and adolescence is particularly difficult to evaluate because young athletes develop at different rates. Physical growth, psychological development, sporting experience, training opportunities, and environmental support can influence observed performance. Consequently, athletes who perform strongly at an early age are not necessarily those who will achieve the highest level as adults [1, 2]. A developmental approach is therefore important. Rather than treating selection as a single event, talent development should be considered as a pathway involving entry into sport, specialized training, competitive progression, elite-youth participation, and transition toward senior performance. At each stage, athletes may require different forms of coaching, competition, educational support, and sport science assistance.

2.2. Relative Age and Athlete Selection

Relative age is an important issue in youth talent identification. Athletes competing within the same chronological age category can differ substantially in physical and biological maturity. Those born earlier in the selection year may therefore have temporary

developmental advantages over relatively younger athletes [4, 5]. Relative-age effects have been reported in different competitive sports [4, 6, 7]. Relatively older athletes may receive greater playing opportunities, coaching attention, competition experience, and access to advanced training. Repeated exposure to these advantages can reinforce early differences and influence later selection. This issue is particularly relevant when talent identification relies heavily on competition results or trials. Athletes who mature later may be overlooked even though they possess long-term sporting potential. Talent-development systems should consequently consider maturation and developmental differences rather than interpreting current physical performance as a direct measure of future ability [5]. For badminton, this concern is relevant because youth players compete within age-group structures and progress through school and elite competition. Selection systems based predominantly on current results may therefore favor athletes who have temporary developmental advantages.

2.3. Early Training and Specialization

Youth athletes often begin structured training at relatively young ages. Appropriate training can facilitate skill acquisition and provide valuable competitive experience. However, early specialization should be managed carefully because long-term athlete development involves physical, psychological, social, and educational considerations. Evidence on young athletes suggests that early promotion and specialization do not automatically guarantee successful senior performance [3]. Intensive commitment to one sport can also limit exposure to broader movement experiences and may contribute to injury, burnout, or withdrawal from sport. Former competitive athletes have similarly demonstrated concerns related to early specialization, injury, and attrition [9]. Training during childhood and adolescence should therefore balance sport-specific development with broader developmental needs. For badminton players, specialized technical training may be necessary, but progression should remain sufficiently flexible to accommodate differences in physical maturation, motivation, and educational responsibilities.

2.4. Social and Environmental Influences

Athlete development occurs within a broader social and environmental system. Families, schools, coaches, sporting organizations, training facilities, financial resources, and competition structures can influence whether a young athlete receives opportunities to develop. Family involvement is particularly important during the early stages of participation because parents may introduce children to sport, provide transportation, support training costs, and encourage continued participation. Schools can also influence development by providing facilities, coaching, competition opportunities, and flexibility for students involved in high-level sport. Socio-economic circumstances can further affect access to specialist coaching, equipment, competitions, and overseas training. Therefore, talent-development opportunities may not be distributed equally even among athletes with similar sporting potential. The present study examines these social and environmental dimensions because the data indicate substantial involvement of parents, schools, coaches, and institutional support throughout the participants' badminton development.

2.5. Coaching and Sport Science Support

Coaching is a central component of talent development because coaches influence technical learning, training organization, competition preparation, motivation, and progression through performance levels. High-quality coaching should therefore involve more than the delivery of training sessions. Coaches need to understand developmental

differences among young athletes and provide environments that support long-term learning and motivation. Training at a young age also requires attention to developmental and physiological considerations. Previous research examining young athletes has emphasized the need to understand the effects of structured training during growth and maturation [8]. Sport science can complement coaching through knowledge related to physical conditioning, training principles, psychology, recovery, and athlete monitoring. However, access to sport science support may vary considerably across developmental levels. The study specifically examines whether young badminton players received such support during performance and elite stages.

2.6. Competition and Developmental Transitions

Competition serves two related functions in youth sport. It provides athletes with opportunities to develop and test sporting skills, while also frequently functioning as a mechanism for talent identification and selection. However, competition structures can create challenges when selection is based mainly on immediate results. A development system should provide sufficient competitive opportunities while also recognizing that athletes progress at different rates. Transitions are another critical component of athlete development. Young athletes may experience substantial changes when progressing from primary to secondary education, from school teams to elite youth programs, and eventually from junior to senior competition. These periods can involve changes in training demands, academic responsibilities, coaching environments, and competitive status. The study identifies the transition from junior elite competition toward senior or national-team participation as a particular concern. Effective talent-development programs therefore require support systems that extend beyond initial identification and continue during critical transitions.

2.7. Conceptual Framework of the Study

Based on the literature and the structure of the investigation, youth badminton talent development can be understood as the interaction of several components: athlete characteristics, relative age and maturation, social background, family support, coaching, competition opportunities, financial resources, sport science support, and developmental transitions. The present study uses these interconnected dimensions to examine how elite youth badminton players in Singapore entered the sport, progressed through specialized training, accessed support, and reached elite youth competition. The framework therefore views talent development as a longitudinal and multidimensional process rather than as a single selection decision.

3. METHOD

3.1. Research Design

This study employed a retrospective descriptive design combining quantitative survey data with qualitative information from open-ended questionnaires and focus group discussions. The design was used to examine the talent-development experiences of elite youth badminton players and the perspectives of coaches. The quantitative component focused on athletes' developmental histories, support services, and satisfaction with the support they received. Qualitative information was used to provide additional explanation of issues related to talent identification, developmental pathways, coaching, and athlete support.

3.2. Participants

The study involved 16 elite youth badminton players, consisting of eight boys and eight girls, and three badminton coaches. The athletes were participants in the 14th ASEAN Schools Badminton Championships held in Manila, Philippines, from 24 to 28 June 2008. The athlete sample represented young players who had already achieved elite school-level competitive status. This sampling context was appropriate to the purpose of examining the developmental pathways and support mechanisms associated with progression to elite youth badminton.

3.3. Research Instruments

Two quantitative surveys were administered during the competition period. Athletes were asked to retrospectively describe their involvement in sport and identify the forms of support received at different stages of development, together with their satisfaction with those services. An open-ended questionnaire containing nine questions was also developed for the coaches. The questions were structured to obtain detailed responses concerning talent identification, development, and athlete support. The questions were adapted from an existing framework concerning the training and development of young athletes [8]. The instruments were subsequently pilot-tested with a comparable group of elite athletes.

3.4. Reliability and Validity

The survey instrument underwent pilot testing before the main study. A test-retest procedure conducted over a two-week interval produced a reported reliability of 98%. Content validity was evaluated by experts and practitioners, including academic lecturers, physical education teachers, and coaches. These procedures were used to strengthen the consistency and relevance of the survey for examining athlete-development experiences.

3.5. Data Collection

Data collection was conducted during the ASEAN Schools Badminton Championships. Athletes completed the quantitative surveys concerning their developmental experiences and support services. Separate focus group discussions (FGDs) were also conducted with coaches and elite badminton players to explore issues in greater detail. The use of FGDs complemented the structured survey information by allowing participants to discuss their experiences of training, selection, support, competition, and progression. Because the study was retrospective, athletes were required to recall experiences from earlier stages of their development. To facilitate recall, the survey was organized according to three developmental phases: initiation, development, and expertise. Additional informal discussions with athletes' parents and coaches were also used in the investigation to help verify the findings.

3.6. Data Analysis

Questionnaire data were analyzed quantitatively using SPSS 30.0 for Windows. The findings were summarized using descriptive statistics. Descriptive indicators included frequencies, percentages, average ages, satisfaction levels, and distributions of athlete characteristics and developmental experiences. Questionnaire data were analyzed using descriptive statistics, including frequencies, percentages, average ages, satisfaction levels, and distributions of athlete characteristics and developmental experiences. Information obtained from open-ended questionnaires and focus group discussions was used to provide contextual interpretation of the quantitative findings.

3.7. Ethical Considerations

The research was approved by the Ministry of Education.

4. RESULTS AND DISCUSSION

4.1. Athlete Characteristics and Developmental Background

The characteristics of the elite youth badminton players are summarized in **Table 1**. Athlete development occurred within a combination of age, socioeconomic, educational, and family conditions. More than half of the athletes were born in the first quarter of the selection year, while none were born in the fourth quarter. This pattern is consistent with relative-age effects reported in youth sport [4, 6, 7]. Relatively older athletes may receive earlier competitive opportunities and greater selection exposure, although the present descriptive study does not establish causality. Family involvement was also prominent. Most players came from families with previous badminton involvement. Access to the sport and continued participation were strongly embedded in the athlete's social environment.

Table 1. Characteristics of elite youth badminton players.

ASPECT	FINDING
Participants	16 players: 8 boys and 8 girls
Mean age	Boys: 17 years 5 months; Girls: 16 years 6 months
Youngest player	15 years 4 months
Oldest player	18 years
Birth quartile	Q1: 56.3%; Q2: 12.5%; Q3: 31.2%; Q4: 0%
Boys' nationality	Singaporean: 50%; Foreign: 50%
Girls' nationality	Singaporean: 62.5%; Foreign: 37.5%
Family involvement in badminton	88.9%
Close relative with school-level sport experience	56.3%
Close relative with international badminton experience	33.3%
Full-time students	100%
Secondary school	43.8%
Post-secondary school/college	56.2%

4.2. Entry into Badminton and Progression

The developmental pathway from introduction to elite youth participation is summarized in **Table 2**. Specialized badminton training began at approximately nine years of age. Early training can support sport-specific skill development, but early specialization should be managed cautiously because junior success does not necessarily guarantee senior performance [3], and specialization has been associated with concerns regarding injury and attrition [9]. Competition and trials were the dominant selection mechanisms. While these provide direct evidence of performance, selection based mainly on current competitive results may disadvantage later-maturing athletes. Talent identification should therefore consider developmental status in addition to immediate performance [4, 5].

4.3. Coaching, Competition, Sport Science, and Financial Support

Support services varied across developmental stages, as summarized in **Table 3**. Coaching was one of the strongest support components. Players were highly satisfied with both elite and school coaches, supporting the importance of coaching quality in long-term talent

development. Youth coaching should also consider growth and maturation because training responses differ during adolescence [8]. In contrast, sport science support was limited at the performance level but became universal at the elite level. This indicates a gap in support before athletes reach the highest youth-development stage. Earlier access to physical conditioning, sport psychology, and appropriate training guidance may strengthen progression. Competition opportunities were another concern. Satisfaction with overseas opportunities was relatively low. Performance development may be constrained by limited exposure to higher-level competition.

Table 2. Entry, specialization, and progression in badminton.

DEVELOPMENTAL ASPECT	BOYS	GIRLS / OVERALL
Mean age starting specialized training	9 years 9 months	9 years 8 months
Mean age progressing to Singapore Schools team	16 years 3 months	15 years 8 months
Introduced to badminton by parents	—	87.5%
Other introduction sources	—	Mother's friend or PE teacher
Main specialized-training facilities	—	Schools: 50%; Clubs: 50%
Selection through trials/competitions	—	81%
Selection by coach or PE teacher	—	Remaining players
Elite-level selection	—	Competition results and trials

Table 3. Support services for elite youth badminton development.

SUPPORT AREA	MAIN FINDING
Satisfaction with elite coaches	94.4%
Satisfaction with school coaches	88.8%
Satisfaction with number of inter-school competitions	56.3%
Satisfaction with overseas competition opportunities at performance level	37.5%
Satisfaction with overseas competition structure	62.5%
Received sport science support at performance level	25%
Received sport science support at elite level	100%
Main financial support at performance level	Schools: 75%; Parents: 25%
Elite-level training expenses	Covered by Ministry of Education
Experience training with Singapore Badminton Association	Approximately 69%

4.4. Social and Developmental Factors Affecting Opportunity

The principal factors influencing development are consolidated in **Table 4**. The interaction of these factors supports a multidimensional view of talent development [1, 2]. Talent should not be interpreted solely from current competitive performance because opportunities, maturation, coaching, family resources, and institutional support influence progression. The relative-age distribution deserves particular attention. Similar patterns have been reported in other elite youth sports [4, 6, 7]. Coaches should therefore avoid equating temporary maturity advantages with long-term sporting potential.

4.5. Transition from Youth to Senior Performance

The transition from elite youth badminton to senior or national-level competition emerged as an important weakness. Players reported concern regarding the availability of support during this stage. A talent-development system should therefore provide continuity rather

than ending at youth selection. Transition support can include appropriate competition exposure, continued coaching, educational flexibility, psychological support, and individualized athlete monitoring. This is consistent with developmental models emphasizing long-term progression instead of one-time talent identification [1, 2].

Table 4. Factors influencing youth badminton talent development.

FACTOR	EVIDENCE FROM THE STUDY	IMPLICATION
Relative age	56.3% born in Q1; none in Q4	Selection may favor relatively older athletes
Socioeconomic background	Players largely from average or higher socioeconomic groups	Financial access may influence opportunity
Family	87.5% introduced by parents	Parents strongly influence entry and continuity
Coaching	High satisfaction with school and elite coaches	Coaching quality is central to progression
Competition	Trials and competition results dominate selection	Performance-based selection may overlook developmental potential
Sport science	25% access at performance level; 100% at elite level	Earlier support may improve development
Finance	Schools, parents, and Ministry of Education provide support	Financial assistance reduces developmental barriers
Transition	Concern about movement from youth to national-level sport	Structured transition support is required

4.6. Proposed Talent-Development Priorities

Table 5 indicates that an effective system should integrate identification, coaching, competition, financial support, sport science, and transition management. The findings therefore support a long-term developmental approach rather than a system based mainly on early competitive success.

Table 5. Recommended priorities for youth badminton talent development.

PRIORITY	RECOMMENDED DIRECTION
Talent identification	Combine competition results with longitudinal coach assessment
Relative-age bias	Consider maturity and relative age during selection [4, 5, 7]
Coaching	Maintain high-quality and developmentally appropriate coaching [8]
Competition	Expand appropriate domestic and overseas competitive opportunities
Sport science	Introduce support earlier in the development pathway
Financial support	Reduce dependence on family resources
Education	Coordinate school and sporting demands
Transition	Create structured pathways from elite youth to senior competition
Early specialization	Balance badminton-specific training with broader development [3, 9]

5. CONCLUSION

Elite youth badminton development is influenced by interacting sporting, social, and environmental factors. Relative age, family support, coaching, competition opportunities, financial resources, and sport science services contributed to athletes' developmental pathways. Competition and trials were the main identification mechanisms, while coaching was a particularly important support component. However, relative-age patterns, unequal developmental opportunities, limited early sport science support, and youth-to-senior transitions require greater attention. Youth badminton programs should therefore adopt an

integrated and longitudinal talent-development approach combining equitable identification, high-quality coaching, appropriate competition, educational support, sport science, financial assistance, and structured transition pathways.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper is free from plagiarism.

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