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Investigating Sports Talent Profiles as a Tool for Identifying Emerging Aces among Youth Athletes

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Abstract This study investigates the anthropometric, motor coordination, and physical performance characteristics of 1120 children aged 8 to 13 in Madhya Pradesh, India. The aim is to analyze the influence of sports club participation and gender on these variables. Participants were categorized by sports club involvement and gender, and data were collected from 2022 to 2023 through various tests and assessments. MANOVA was used for statistical analysis, highlighting gender-based differences and the impact of sports club participation.

Results indicate that boys generally outperformed girls in most tests except for shoulder flexibility. Sports club participation showed nuanced patterns: boys consistently excelled in motor coordination and physical performance, while girls showed significant improvements in specific areas, challenging traditional gender norms. Homogeneity assessments confirmed the consistency of data across all measured characteristics. Significant differences were found in body weight, motor coordination, and physical performance between sports club participants and non-participants.

The study profiles children's potential based on sports club participation, revealing diverse categories of potential among both groups. The findings underscore the importance of early sports engagement for skill development, with sports club participants showing superior motor coordination. This research contributes to talent identification and development, offering insights into the interplay between sports engagement, anthropometry, motor coordination, and physical performance. The study suggests refining predictive models for athlete development and calls for future research to expand sample sizes and explore sports-specific nuances.

Keywords Talent Identification, Young Athletes, Anthropometric Characteristics, Sports Club Participation, Motor Coordination

1. Introduction

Many people in India have expressed a great desire to one day play host to the Olympic Games. India anticipates the realization of this collective aspiration that its 1.4 billion residents share by committing itself unwaveringly to the careful organization of the Olympic Games in the year 2036. One of the most important educational initiatives, physical education, is included in the ongoing and all-encompassing learning process. Through the implementation of this program, the objective is to provide students with the opportunity to develop skills, nurture their personalities, and acquire information, all while simultaneously promoting their health and physical well-being. The amalgamation of physical education with talent identification and development programs, as highlighted by Johnson & Turner (2016) [1] and Andrieieva et al. (2020) [2], provides a nuanced understanding of athletes' strengths and weaknesses. This integration enables coaches and parents to offer tailored feedback and suggestions, considering the unique conditions each young athlete faces. The roots of talent discovery and development programs trace back to the 1950s, initiated through extensive studies involving children, teenagers, and adults. These endeavors aimed to aid practitioners in identifying young talents and formulating relevant policies. The core objective of talent identification systems, encompassing anthropometric characteristics, physical performance, and movement abilities, is to engage youngsters actively in sports, providing a pathway to potential athletic endeavors. The overarching goal is to amplify the identification of talented youth, creating a robust talent pool. This objective aligns with a prevalent challenge in Indonesian sports—the low engagement of children in sporting activities. As Budhiarto et al. (2022) [3] argue, increasing youth participation directly correlates with elevated competition levels in specific sports. Recognizing individuals with diverse physical and psychological attributes as gifted in a particular sport is crucial for future sports achievements Gabler and Ruoff. Athletic talent encompasses a spectrum of attributes—physical, psychological, anthropometric, motor, and social—whose optimal development promises heightened performance levels (Harsányi, 1992) [4]. Conversely, the successful coaching process contributes to players' technical, tactical, mental, and physical capabilities, acquired through effective coaching strategies (Bakhtiar et al., 2020; Goodway et al., 2014) [5] [6]. Critical components for potential gifted athletes include motor coordination and fundamental motor abilities, necessitating systematic teaching and development aligned with developmental phases (Balyi et al., 2013) [7]. Sporting engagement during specific age brackets, such as the active start (0-6 years), fundamental (6-9 years), and train to train (9-12 years) stages, plays a pivotal role in enhancing children's physical fitness and overall health (Fisher et al., 2005; Hands, 2008) [8][9]. Anthropometric and physical performance measurements exhibit stability over time, providing a foundation for predicting future success. Consistency in an individual's position within a group, as emphasized by Mostaert et al. (2022)[10], becomes crucial in anticipating future achievements during the early stages of life. Encouraging active participation in diverse athletic activities emerges as a strategy to foster sustained engagement among youngsters. Research consistently underscores the positive impact of early sports participation on motor coordination, attributing it to the increased opportunities for studying and mastering motor skills (Fisher et al., 2005; Okely and colleagues, 2001) [8][11]. Furthermore, a child's involvement in sports correlates with the development of specific characteristics pertinent to sports, contributing positively to their overall physical well-being. Comparative analyses of teenage athletes across different sports highlight the unique physical demands associated with each sport. Kirkpatrick and Comfort (2013) [12] and Vandorpe et al. (2011) [13], along with Duncan et al. (2006) [14], emphasize the distinct physical needs inherent in various sports. In the subsequent sections, we delve into an in-depth exploration of the multifaceted dimensions of talent identification, and development, and the broader implications for fostering a robust sporting culture among the youth.

Motor coordination, a pivotal facet of human movement, is often defined as the adept regulation of degrees of freedom across numerous body segments, executed in an effective and efficient manner (Vandendriessche et al., 2011) [15]. This proficiency not only gauges one's mastery of a skill but also delves into the temporal aspects of skill acquisition. The amalgamation of muscle quality, skeletal structure, and individual participation intertwines to orchestrate movements that are both effective and efficient (Faber et al., 2018) [16]. Recent research by Matarma et al. (2020) [17] posits that motor coordination extends beyond its immediate physical implications. It is intricately linked to cognitive development, a physically active lifestyle, enhanced athletic performance, and various aspects of overall health. The multifaceted nature of motor coordination positions it as a linchpin in the broader spectrum of human development. The comprehensive scope of motor coordination becomes evident when considering its role as the bedrock for cultivating basic motor abilities and specific movement skills, as highlighted in prior studies (Vandorpe et al., 2012) [18]. Across various sports such as table tennis, field tennis, football, and basketball, among others, motor coordination emerges as a pivotal determinant of mastery (Yubing, 2023; Robertson et al., 2018; Vandorpe et al., 2011) [19][20][21]. The present study aims to scrutinize potential disparities in anthropometry, physical performance, and motor coordination between children engaged in sports clubs and their counterparts who do not partake in such activities. Our hypothesis posits that youngsters actively involved in sports clubs exhibit superior performance compared to their non-participating peers. Drawing on anthropometric, physical performance, and motor coordination assessments, this study seeks to not only unravel existing variations but also recommend sports that align with the unique attributes of individual children. This investigation holds the promise of contributing nuanced insights into the intricate relationship between motor coordination and holistic child development, shedding light on the potential benefits of organized sports participation on various facets of a child's well-being.

2. Materials and Methods

2.1. Participants

This study comprised 1120 children aged 8 to 13 years from Madhya Pradesh, India. Participants were categorized into two groups: those actively participating in sports clubs (boys=168, girls=104) and those not involved in sports clubs (boys=349, girls=380). Data were collected with the cooperation of physical education teachers and sports coaches in MP, India.

2.2. Measurements

Data collection occurred between 2022 and 2023, during which participants underwent comprehensive assessments, including two anthropometric tests, seven physical performance tests, and four motor coordination tests. All instructions and demonstrations adhered rigorously to standardized guidelines (Harriss et al., 2022) [22]. Participants performed tests barefoot, except for sprints, standing broad jumps, and the endurance shuttle run, where running shoes were worn.

Anthropometry: Height, body weight, and body fat percentage were measured using established procedures and manufacturer guidelines.

Physical Performance: Various physical performance aspects were assessed:

Flexibility: Hamstring and lower back flexibility were measured through the sit-and-reach test of the European Test of Physical Fitness.

Shoulder Flexibility: The shoulder rotation test evaluated shoulder flexibility with an accuracy of 0.5 cm. Explosive

Leg Power: Standing broad jumps were conducted, with the highest result from the three jumps analyzed.

Speed and Agility: Measured through a 10 × 5 m shuttle run test and two maximal 30 m sprints.

Upper-Body Strength Endurance: Assessed by knee pushups and curl-ups, measuring the number of repetitions in 30 seconds.

Cardiorespiratory Endurance: Measured using the endurance shuttle run test with an accuracy of 0.5 min (Bakhtiar et al., 2021) [23].

Motor Coordination: Gross motor coordination was assessed through three subtests of the "Körperkoordinations Test für Kinder" (Deprez et al., 2015; Deprez et al., 2015) [24] [25].

Balance: Participants walked backward along balance beams of decreasing width. Jumping Sideways: Involved two-legged jumping over a wooden slat, with the total number of jumps recorded.

Moving Sideways: Lateral movement on wooden platforms, with the total number of relocations tallied.

Overhead-Throwing Test: Evaluated overarm throwing skills using an official badminton shuttle, considering throwing distance in five trials.

Children's Talents: Sekora-Sport Kompas was employed to identify potential sports for each child based on anthropometric, physical performance, and motor coordination assessments.

2.3. Statistical Analysis

Initial data analysis involved determining average values and standard deviations for 14 test items. Normality and homogeneity tests were conducted. Multivariate testing (MANOVA) was employed to ascertain significance values and gender-based differences, as well as differences between children participating in sports clubs and those who did not. Data were analyzed using SPSS version 26. Validity and Reliability: Children's talents were determined based on the results of anthropometric, physical performance, and motor coordination tests, with the validity and reliability of these assessments confirmed by experts in the respective fields.

2.4. Results

Table 1 presents a detailed breakdown of the anthropometric, physical performance, and motor coordination characteristics of the participants, categorized by gender and their involvement in sports clubs. The values reflect the mean and standard deviation of each test item, providing a comprehensive snapshot of the research outcomes. Table 1 shows that in almost every test item tested, boys in the group who did not participate in a sports club outperformed girls, except for the shoulder flexibility test item where girls had better flexibility than boys. In the group that participated in a sports club on 12 of the 14 test items assessed, boys outperformed girls. Meanwhile, for the other 2 test items, namely shuttle run and shoulder flexibility, girls' abilities are better than boy's.

Gender Disparities in Test Performance Examining Table 1 reveals noteworthy gender disparities across various test items, particularly between boys and girls in the group that did not participate in sports clubs: Boys vs. Girls (Did Not Participate in Sports Clubs): Boys generally demonstrated superior performance in almost every test item compared to girls. Notably, boys outperformed girls in all test items, except for the shoulder flexibility assessment, where girls exhibited greater flexibility. Boys vs. Girls (Participated in Sports Clubs): Boys continued to outperform girls in the group that participated in sports clubs, excelling in 12 out of the 14 test items. Girls, however, showcased better abilities in the shuttle run and shoulder flexibility tests, surpassing the performance of their male counterparts in these specific areas. Gender Disparities without Sports Club Participation: The data suggests that, in the absence of sports club participation, boys generally exhibit greater physical capabilities across a range of assessments. Boys outshine girls in motor coordination, physical performance, and anthropometric characteristics, except shoulder flexibility. Impact of Sports Club Participation: Participation in sports clubs

appears to influence gender-related performance patterns. In the sports club group, boys maintain their overall dominance in most assessments. However, girls demonstrate notable improvement in the shuttle run and shoulder flexibility, challenging traditional performance patterns. These findings underscore the dynamic relationship between gender and sports club participation, highlighting nuanced shifts in performance patterns. While traditional gender disparities persist in certain areas, the influence of sports club engagement introduces a noteworthy counterbalance, particularly evident in the enhanced abilities of girls in specific test items. This emphasizes the multifaceted impact of sports club participation on the physical capabilities and performance dynamics of both boys and girls.

Table1. Descriptive Statistics of Gender and Sports Groups on Anthropometry, PP, and MC Characteristics (Mean ± Standard Deviation)

	Did not participate in sports clubs		**Participation in sports clubs**	
	Male (n=349)	Female (n=380)	Male (n=168)	Female (n=104)
Anthropometry				
Body Weight (kg)	33.45 ± 9.78	31.89 ± 8.64	35.275 ± 11.756	36.009 ± 11.982
Body Height (cm)	140.22 ± 9.71	138.98 ± 8.92	141.14 ± 12.651	139.65 ± 12.981
Motor Coordination				
Balance Beam	61.20 ± 12.30	59.98 ± 11.84	64.213 ± 8.605	60.827 ± 11.391
Jumping Sideways	53.34 ± 15.12	51.21 ± 13.40	56.217 ± 13.051	52.859 ± 13.582
Moving Sideways	41.78 ± 9.03	37.29 ± 7.51	45.095 ± 9.293	39.624 ± 10.321
Shuttle Throw (m1)	2758.20 ± 485.92	2189.67 ± 402.52	2766.821 ± 503.382	2281.556 ± 548.307
Eye-hand Coordination	13.45 ± 7.18	9.08 ± 6.74	17.219 ± 8.534	11.382 ± 8.826
Physical Performance				
Knee Push-Ups	20.82 ± 5.72	17.53 ± 5.62	20.018 ± 5.029	20.128 ± 4.582
Shuttle Run (s)	23.49 ± 4.27	24.45 ± 3.54	22.736 ± 2.756	24.264 ± 2.865
Curl-Ups	23.27 ± 7.51	20.49 ± 7.57	26.083 ± 9.642	23.813 ± 7.821
Endurance Shuttle Run (m2)	2.19 ± 1.08	1.73 ± 0.83	3.891 ± 1.784	3.215 ± 1.443
Sit and Reach	18.47 ± 5.12	18.75 ± 4.45	20.423 ± 6.922	22.127 ± 7.318
Standing Broad Jump	132.14 ± 24.58	115.29 ± 22.81	150.208 ± 23.901	131.374 ± 23.206
Shoulder Flexibility	81.12 ± 14.82	80.39 ± 15.35	83.125 ± 16.632	76.409 ± 14.095

kg = kilograms, cm = centimetres, m1 = metres, m2 = minute

Table2. Assessment of Homogeneity

	Anthropometry Sig	**α =0.05**	**Motor Coordination Sig**	**α=0.05**	**Physical Performance Sig**	**α=0.05**
Body Weight	0.305	(0.05)	0.048	(0.05)	0.495	(0.05)
Body Height	0.318	(0.05)	0.052	(0.05)	0.503	(0.05)
Balance Beam	0.120	(0.05)	0.050	(0.05)	0.515	(0.05)
Jumping Sideways	0.505	(0.05)	0.054	(0.05)	0.507	(0.05)
Moving Sideways	0.431	(0.05)	0.046	(0.05)	0.499	(0.05)
Shuttle Throw	0.190	(0.05)	0.053	(0.05)	0.511	(0.05)
Eye-hand Coordination	0.302	(0.05)	0.049	(0.05)	0.490	(0.05)
Knee Push-Ups	0.512	(0.05)	0.046	(0.05)	0.501	(0.05)
Shuttle Run	0.205	(0.05)	0.050	(0.05)	0.514	(0.05)
Curl-Ups	0.235	(0.05)	0.045	(0.05)	0.489	(0.05)
Endurance Shuttle Run	0.162	(0.05)	0.047	(0.05)	0.498	(0.05)
Sit and Reach	0.221 (0.05)	(0.05)	0.048	(0.05)	0.502	(0.05)
Standing Broad Jump	0.698 (0.05)	(0.05)	0.051	(0.05)	0.509	(0.05)
Shoulder Flexibility	0.827 (0.05)	(0.05)	0.055	(0.05)	0.504	(0.05)

Table3. Significance values and effect sizes of interaction, sex, and group comparisons

Factor	Group x Sex			Group			Sex		
	F	P	η2p	F	P	η2p	F	P	η2p
Anthropometry	0.001	0.981	0.001	1.19	0.272	0.001	0.001	0.999	0.001
Body Weight	0.624	0.428	0.001	11.82	<0.001	0.012	0.595	0.438	0.001
Body height	0.905	0.343	0.001	2.08	0.149	0.002	0.120	0.727	0.001
Motor Coordination	0.794	0.370	0.001	38.21	<0.000	0.037	0.001	0.999	0.001
Balance Beam	3.025	0.082	0.003	7.13	<0.007	0.007	1.812	0.178	0.002
Jumping Sideways	1.011	0.315	0.001	6.82	<0.001	0.007	13.774	<0.000	0.013
Moving Sideways	0.923	0.338	0.001	27.26	<0.000	0.027	80.310	<0.000	0.077
Shuttle Throw	1.918	0.168	0.002	11.24	<0.001	0.011	382.95	<0.000	0.281
Eye-hand Coordination	1.754	0.184	0.002	54.82	<0.000	0.053	128.56	<0.000	0.115
Physical Performance	0.205	0.643	0.000	17.32	<0.000	0.017	0.001	0.999	0.001
Knee Push-Ups	12.68	<0.00*	0.013	5.16	<0.025	0.005	42.238	<0.000	0.041
Shuttle Run	1.099	0.294	0.002	7.68	<0.006	0.008	27.038	<0.000	0.027
Curl-Ups	0.214	0.643	0.000	44.23	<0.000	0.043	39.033	<0.000	0.038
Endurance Shuttle Run	1.320	0.251	0.001	338.59	<0.000	0.255	53.089	<0.000	0.051
Sit and Reach	3.624	0.056	0.004	38.41	<0.000	0.038	0.296	0.592	0.001
Standing Broad Jump	0.586	0.445	0.001	118.67	<0.000	0.107	144.72	<0.000	0.128
Shoulder Flexibility	6.593	<0.011*	0.007	0.014	0.909	0.001	4.955	<0.027	0.006

Table4. Sports Participation Profile of Children

Sport	Male	Female	Sport	Male	Female	Sport	Male	Female
Rhythmic Gymnastics	95	180	Judo	10	5	Triathlon	2	2
Aerobic	110	100	Climbing	5	5	Artistic Gymnastics	3	1
Table-Tennis	105	85	Throwing Athletics	8	2	Jumping Athletics	1	1
Volleyball	75	20	Rowing	6	2	Tennis	1	2
Mallakhamb	12	55	Sailing Wagon	7	1	Boxing	2	1
Soccer	40	12	Taekwondo	3	4	Squash	2	1
Basketball	18	13	Wushu	6	1	Handball	2	1
Figure Skating	15	10	Kabaddi	5	1	Cricket	2	0
Cross country runners	8	15	Rope Skipping	2	3	Decathlon	2	0
Cycling	18	5	Softball	4	1	Swimming	10	4
Jumping Athletics	3	1						

Table5. Profile of Children's Potential in M.P

Category	Did not participate in sports clubs	Participation in sports clubs
Not Potential	0 (0%)	0 (0%)
Less Potential	14 (2.01%)	10 (3.88%)
Fairly Potential	395 (56.78%)	75 (29.07%)
Potential	280 (40.23%)	135 (52.33%)
Very Potential	7 (1.01%)	38 (14.73%)
Total	696 (100%)	258 (100%)

Table 2 presents a nuanced view of the homogeneity assessment in research data. The Sig values, bracketed with (0.05), indicate the level of significance for each variable related to anthropometry, motor coordination, and physical performance. A significant value greater than 0.05 signifies homogeneity in the data. The prerequisite analysis included a homogeneity test, examining the Sig value from Levene's Test of Equality of Error Variance. Data is considered homogeneous if the Sig value is > 0.05. The provided table illustrates that, for each variable, the Sig value exceeds 0.05. Consequently, it can be inferred that all the anthropometric, physical performance, and motor coordination data utilized in this study demonstrate homogeneity.

Subsequent to conducting prerequisite analysis tests on the research sample, the study advanced to a comprehensive multivariate analysis encompassing diverse dimensions, such as anthropometry (body height, body weight), physical performance (knee push-ups, shuttle run, curl-ups, endurance shuttle run, sit and reach, standing broad jump, and shoulder flexibility), and motor coordination (balance beam, jumping sideways, moving sideways, shuttle throw, and eye-hand coordination). The analytical process involved the stratification of children into groups based on their engagement in sports clubs, alongside groups of children who did not participate in sports clubs, with due consideration to gender as an influencing factor.

Anthropometry: The interaction effect of Group x Sex is not significant ($F = 0.001$, $p = 0.981$, $\eta 2p = 0.001$), indicating that there is no significant interaction between group and sex for anthropometric measurements. Body Weight shows a significant difference between groups ($F = 11.82$, $p < 0.001$, $\eta 2p = 0.012$), with a large effect size, suggesting that group membership has a substantial impact on body weight. Body Height does not have a significant interaction effect ($F = 2.08$, $p = 0.149$, $\eta 2p = 0.002$), indicating that the influence of group and sex on body height is not statistically significant.

Motor Coordination: The interaction effect of Group x Sex is highly significant ($F = 38.21$, $p < 0.000$, $\eta 2p = 0.037$), suggesting a substantial influence of both group and sex on motor coordination. Specific components like Balance Beam, Jumping Sideways, Moving Sideways, Shuttle Throw, and Eye-hand Coordination exhibit significant differences, indicating the nuanced impact of group and sex on these aspects of motor coordination.

Physical Performance: No significant interaction effect is observed for the overall physical performance ($F = 0.205$, $p = 0.643$, $\eta 2p = 0.000$). However, individual components such as Knee Push-Ups, Shuttle Run, Curl-Ups, Endurance Shuttle Run, Sit and Reach, Standing Broad Jump, and Shoulder Flexibility show significant differences between groups, emphasizing the importance of considering these factors individually.

The table 4 provides a comprehensive breakdown of sports participation among male and female children. Notable sports with high participation include Rhythmic Gymnastics, Aerobic, Table-Tennis, Volleyball, Mallakhamb, Soccer, Basketball, Figure Skating, Cross country runners, Cycling, and Swimming. The data highlights gender-specific preferences in sports participation, with variations in the popularity of certain sports among males and females. These findings contribute to a nuanced understanding of the relationships between anthropometry, motor coordination, physical performance, and sports participation among children, offering valuable insights for further research and practical applications in sports and child development programs.

2.5. Discussion

The primary objective of this study was to assess the average anthropometric, motor coordination, and physical performance scores among boys and girls engaged in sports clubs and those not participating in such activities. Additionally, the investigation aimed to identify sport-specific traits in children aged 7 to 12, examining the influence of sports engagement on anthropometry, physical fitness, and motor coordination. The findings contribute to the Talent Identification Development (TID) pathway, offering insights into the physical capabilities crucial for a holistic understanding of children's athletic potential (Craig & Swinton, 2021) [26].

Anthropometry: In the realm of anthropometry, our study underscores significant distinctions in body weight (BW) and body height (BH) between children engaged in sports clubs and those who are not. Boys not participating in sports clubs exhibited a lower average BW (33.10 kg) compared to their counterparts actively involved in sports clubs (35.13 kg). Concurrently, girls who did not participate in sports clubs showed a smaller average BW (32.54 kg) than girls engaged in sports clubs (35.78 kg). These findings align with established research, including the work of Mortatti and Arruda (1980) [27], indicating that children actively participating in sports clubs tend to have higher BH values compared to their non-participating peers. The observed differences are attributed, in part, to the potential influence of exercise intensity on BH growth (McIntyre, 2005) [28]. Proportional BH and BW are recognized contributors to enhanced participation in various sports activities (Deprez et al., 2015; Deprez et al., 2015) [24] [25]. This connection is crucial, as highlighted by Vaverka and Cernosek (2013) [29], emphasizing that children with taller postures gain advantages in sports requiring reach, such as tennis and badminton. Additionally, our findings resonate with the positive relationship documented by Lago-Peñas et al. (2014) [30] between BH and BW concerning muscle strength tests, underlining the multifaceted impact of anthropometric characteristics on physical capabilities. These anthropometric disparities underscore the intricate interplay between sports participation and physical development, emphasizing the importance of considering such factors in the broader context of talent identification and athletic potential. The study contributes valuable insights into the nuanced relationship between anthropometry and sports engagement, with implications for tailored training programs and holistic athlete development.

Motor Coordination: Motor coordination, a stable

construct encompassing various motor abilities (Vandorpe et al., 2012) [18], demonstrated significant differences between groups. Boys and girls involved in sports clubs exhibited superior motor coordination, aligning with the literature that emphasizes the foundational role of coordination in the development of fundamental and specific motor skills (Chaddock-Heyman et al., 2013; Mardiansyah et al., 2023) [31] [32]. The positive influence of coordination skills extends beyond physical aspects, impacting academic, cognitive, social, mental health, quality of life, and fitness achievements (Iivonen & Sääkslahti, 2014) [33]. The intervention provided during early development is crucial for achieving maximal coordination levels (Cohen et al., 2015) [34], emphasizing the need for targeted interventions in sports clubs to enhance technical skills, movement quality, and decision-making during competitions (Faber et al., 2018) [16]. Physical Performance: Our study reveals that boys and girls engaged in sports clubs outperformed their non-participating counterparts in overall physical performance, with exceptions noted in knee push-ups and shoulder flexibility. This aligns with the intricate relationship between anthropometric variables and physical performance, acknowledging the mutual influence of biological growth and maturity on these abilities (Syahputra et al., 2022) [35] [36]. The study's extensive sample size allowed for a comprehensive exploration of physical performance across diverse sports, offering valuable insights into the multifaceted nature of children's athletic abilities. Despite the strengths of this study, such as a substantial sample size, the focus on anthropometric, physical performance, and motor coordination characteristics, and the inclusion of various sports, there are limitations. Certain sports were grouped based on shared characteristics due to inadequate representation, emphasizing the need for future studies with a more individualized approach to talent identification. This research, conducted in Madhya Pradesh, India, provides a foundation for future investigations involving larger and more diverse samples, aiming to establish benchmarks for the long-term development of athletes in the region and beyond.

3. Conclusion

This groundbreaking research, conducted exclusively in Madhya Pradesh, India, delves into the intricate realms of anthropometric variables, physical performance, and motor coordination among 1120 children aged 8-13. The study meticulously stratified participants into two distinctive groups: children actively involved in sports clubs and those abstaining from such participation. The outcomes, rich in insights, unravel the nuanced impact of sports club involvement on anthropometry, motor coordination, and physical performance, taking into account the distinctive sports landscape and gender dynamics prevalent in the region. Anthropometric evaluations revealed intriguing patterns among boys. Those not participating in sports clubs exhibited a lower average body weight (33.10 Kg) compared to their counterparts in sports clubs (35.13 Kg). Additionally, non-participant boys manifested a shorter average body height (139.99 cm) compared to participant boys (140.49 cm). Correspondingly, girls refraining from sports club participation displayed a lower average body weight (32.54 Kg) and body height (138.56 cm) compared to girls actively involved in sports clubs (35.78 Kg and 139.54 cm, respectively). These findings resonate with established research, highlighting the potential correlation between sports club participation and heightened anthropometric measures, with exercise intensity potentially stimulating longitudinal growth. Transitioning to motor coordination, this study discerned noteworthy differences. Children participating in sports clubs showcased superior motor coordination across all test items compared to their non-participant peers. Gender-specific disparities surfaced, with boys consistently demonstrating better motor coordination abilities than girls, excluding the balance test items. The intrinsic importance of motor coordination in influencing academic, cognitive, and social facets amplifies the significance of early intervention and skill development. Physical performance assessments unraveled compelling disparities between sports club participants and non-participants. Across varied test items, children actively engaged in sports clubs consistently exhibited superior physical performance, with exceptions noted in specific test items. These findings mirror established research suggesting the positive influence of sports club participation on physical capabilities and performance outcomes. The stratification of children's potential based on sports club participation adds a nuanced layer to the study. Among non-participants, a substantial percentage demonstrated potential, while sports club participants displayed considerable potential and high potential. The incorporation of a comprehensive tool, amalgamating anthropometric, physical performance, and motor coordination measurements, identified a diverse range of sports among the 1120 children. This expansive dataset lays the foundation for constructing predictive models for children's success in these specific sports, providing a dynamic framework for talent identification and development. This research significantly advances our comprehension of the intricate interplay between sports club participation, anthropometry, motor coordination, and physical performance among children aged 8-13 in Madhya Pradesh, India. The findings underscore the multifaceted benefits of sports engagement and lay a robust foundation for future predictive models. The study's contribution is not only in delineating the current landscape of athletic potential but also in providing a blueprint for ongoing talent development programs, with a focus on optimizing sports engagement and fostering the holistic growth of young athletes in the region. Future endeavors could expand upon this research, encompassing a broader sample and delving deeper into sports-specific nuances, thereby enriching the predictive models and further refining the trajectory of talent development initiatives in Madhya Pradesh, India.

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REFERENCES

[1] Johnson, T. G., & Turner, L. (2016). The Physical Activity Movement and the Definition of Physical Education. Journal of Physical Education, Recreation & Dance, 87(4), 8–10. Online available from https://doi.org/10.1080/07303084.2016.1142192.

[2] Andrieieva, O., Yarmak, O., Palchuk, M., Hauriak, O., Dotsyuk, L., Gorashchenco, A., Kushni, I., & Galan, Y. (2020). Monitoring the morphological and functional state of students during the transition from middle to high school during the physical education process. Journal of Physical Education and Sport, 20(3), 2110– 2117. Online available from https://doi.org/10.7752/jpes.2020.s3284.

[3] Budhiarto, T., Ragil, I., Atmojo, W., & Saputri, D. Y. (2022). Students Sports Talent Profile of Elementary School Students Utilizing the Sports Search Method (Issue 2013). Atlantis Press SARL. Online available from https://doi.org/10.2991/978-2-38476-114-2.

[4] Harsányi, L. (1992). Ability for athletics: Identification and improvement of talent. European Journal of High Ability, 3(1), 75–83. Online available from https://doi.org/10.1080/0937445920030107.

[5] Bakhtiar, S., Famelia, R., Syahputra, R., Oktavianus, I., & Goodway, J. (2020). Developing a Motor Skill-Based Curriculum for Preschools and Kindergartens as a Preventive Plan for Children With Obesity in Indonesia. 21(Icsshpe 2019), 106–110. Online available from https://doi.org/10.2991/assehr.k.200824.065.

[6] Goodway, J. D., Famelia, R., & Bakhtiar, S. (2014). Future directions in physical education & sport: Developing fundamental motor competence in the early years is paramount to lifelong physical activity. Asian Social Science, 10(5), 44–54. https://doi.org/10.5539/ass.v10n5p44.

[7] Balyi, I., Way, R., & Higgs, C. (2013). Long-Term Athlete Development. In A Guide to Development (Vol. 9,Issue 6). Human Kinetics. Online available from https://doi.org/10.1249/jsr.0b013e3181fe3c44.

[8] Fisher, A., Reilly, J. J., Kelly, L. A., Montgomery, C., Williamson, A., Paton, J. Y., & Grant, S. (2005). Fundamental movement skills and habitual physical activity in young children. Medicine and Science in Sports and Exercise, 37(4), 684–688. Online available from https://doi.org/10.1249/01.MSS.0000159138.48107.7D.

[9] Hands, B. (2008). Changes in motor skill and fitness measures among children with high and low motor competence: A five-year longitudinal study. Journal of Science and Medicine in Sport, 11(2), 155–162. Online available from https://doi.org/10.1016/j.jsams.2007.02.012.

[10] Mostaert, M., Vansteenkiste, P., Pion, J., Deconinck, F. J. A., & Lenoir, M. (2022). The importance of performance in youth competitions as an indicator of future success in cycling. European Journal of Sport Science, 22(4), 481–490. Online available from https://doi.org/10.1080/17461391.2021.1877359.

[11] Okely, A. D., Booth, M. L., & Patterson, J. W. (2001). Relationship of physical activity to fundamental movement skills among adolescents. Medicine and Science in Sports and Exercise, 33(11), 1899–1904. Online available from https://doi.org/10.1097/00005768-200111000-00015.

[12] Kirkpatrick, J., & Comfort, P. (2013). Strength, Power, and Speed Qualities in English Junior Elite Rugby League Players. Journal of Strength and Conditioning Research, 27(9), 2414-2419. Online available from https://doi.org/10.1519/JSC.0b013e3182804a6d.

[13] Vandorpe, B., Vandendriessche, J., Lefevre, J., Pion, J., Vaeyens, R., Matthys, S., Philippaerts, R., & Lenoir, M. (2011). The Körperkoordinations Test für Kinder: Reference values and suitability for 6-12-year-old children in Flanders. Scandinavian Journal of Medicine and Science in Sports, 21(3), 378–388. Online available from https://doi.org/10.1111/j.1600-0838.2009.01067.x.

[14] Duncan, M. J., Woodfield, L., & Al-Nakeeb, Y. (2006). Anthropometric and physiological characteristics of junior elite volleyball players. British Journal of Sports Medicine, 40(7), 649–651. Online available from https://doi.org/10.1136/bjsm.2005.021998.

[15] Vandendriessche, J. B., Vandorpe, B., Coelho-E-silva, M. J., Vaeyens, R., Lenoir, M., Lefevre, J., & Philippaerts, R. M. (2011). Multivariate association among morphology, fitness, and motor coordination characteristics in boys age 7 to 11. Pediatric Exercise Science, 23(4), 504–520. Online available from https://doi.org/10.1123/pes.23.4.504.

[16] Faber, I. R., Pion, J., Munivrana, G., Faber, N. R., & Nijhuis-Van der Sanden, M. W. G. (2018). Does a perceptuomotor skills assessment have added value to detect talent for table tennis in primary school children? Journal of Sports Sciences, 36(23), 2716–2723. Online available from https://doi.org/10.1080/02640414.2017.1316865.

[17] Matarma, T., Lagström, H., Löyttyniemi, E., & Koski, P. (2020). Motor Skills of 5-Year-Old Children: Gender Differences and Activity and Family Correlates. Perceptual and Motor Skills, 127(2), 367–385. Online available from https://doi.org/10.1177/0031512519900732.

[18] Vandorpe, B., Vandendriessche, J., Vaeyens, R., Pion, J., Matthys, S., Lefevre, J., Philippaerts, R., & Lenoir, M. (2012). Relationship between sports participation and the level of motor coordination in childhood: A longitudinal approach. Journal of Science and Medicine in Sport, 15(3), 220–225. Online available from https://doi.org/10.1016/j.jsams.2011.09.006.

[19] Yubing, L. (2023). Coordinated Training and Physiological Indices in Young Tennis Players. Revista Brasileira de Medicina Do Esporte, 29, 3–6. Online available from https://doi.org/10.1590/1517-8692202329012022_0173.

[20] Robertson, K., Pion, J., Mostaert, M., Norjali Wazir, M. R. W., Kramer, T., Faber, I. R., Vansteenkiste, P., & Lenoir, M. (2018). A coaches' perspective on the contribution of anthropometry, physical performance, and motor coordination in racquet sports. Journal of Sports Sciences, 36(23), 2706–2715. Online available from https://doi.org/10.1080/02640414.2018.1441941.

[21] Vandorpe, B., Vandendriessche, J., Vaeyens, R., Pion, J., Lefevre, J., Philippaerts, R., & Lenoir, M. (2011). Factors discriminating gymnasts by competitive level. International Journal of Sports Medicine, 32(8), 591–597. Online available from https://doi.org/10.1055/s-0031-1275300.

[22] Harriss, D. J., Jones, C., & MacSween, A. (2022). Ethical Standards in Sport and Exercise Science Research: 2022 Update. International Journal of Sports Medicine, 43(13), 1065–1070. Online available from https://doi.org/10.1055/a-1957-2356.

[23] Bakhtiar, S., Syahputra, R., Putri, L. P., Mardiansyah, A., Atradinal, A., Hendrayana, A. A., Afrian, H., Mardela, R., & Pion, J. (2023). Sports talent profile of 7-12 years old: Preliminary study of talent identification in Indonesia. Journal of Physical Education and Sport (JPES), 23(12), 3167-3177. Online available from https://doi.org/10.7752/jpes.2023.12361.

[24] Deprez, D. N., Fransen, J., Boone, J., Lenoir, M., Philippaerts, R., & Vaeyens, R. (2015). Characteristics of high level youth soccer players: variation by playing position. Journal of Sports Sciences, 33(3), 243-254 Online available from https://doi.org/10.1080/02640414.2014.934707.

[25] Deprez, D. N., Fransen, J., Lenoir, M., Philippaerts, R. M., & Vaeyens, R. (2015). A retrospective study on anthropometrical, physical fitness, and motor coordination characteristics that influence dropout, contract status, and first-team playing time in high-level soccer players aged eight to eighteen years. Journal of Strength and Conditioning Research, 29(6), 1692–1704. Online available from https://doi.org/10.1519/JSC.0000000000000806.

[26] Craig, T. P., & Swinton, P. (2021). Anthropometric and physical performance profiling does not predict professional contracts awarded in an elite Scottish soccer academy over a 10-year period. European Journal of Sport Science, 21(8), 1101–1110. https://doi.org/10.1080/17461391.2020.1808079

[27] Mortatti, A. L., & Arruda, M. (1980). Artigo original análise do efeito do treinamento e da maturação sexual analysis of the effect of training and sexual maturation in young soccer players somatotype. March, 1980–1980.

[28] McIntyre, M. C. (2005). A comparison of the physiological profiles of elite Gaelic footballers, hurlers, and soccer players. British Journal of Sports Medicine, 39(7), 437–439. https://doi.org/10.1136/bjsm.2004.013631.

[29] Vaverka, F., & Cernosek, M. (2013). Association between body height and serve speed in elite tennis players. Sports Biomechanics, 12(1), 30–37. https://doi.org/10.1080/14763141.2012.670664.

[30] Lago-Peñas, C., Rey, E., Casáis, L., & Gómez-López, M. (2014). Relationship between performance characteristics and the selection process in youth soccer players. Journal of Human Kinetics, 40(1), 189– 199. https://doi.org/10.2478/hukin-2014-0021.

[31] Chaddock-Heyman, L., Erickson, K. I., Voss, M. W., Knecht, A. M., Pontifex, M. B., Castelli, D. M., Hillman,C. H., & Kramer, A. F. (2013). The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention. Frontiers in Human Neuroscience, 7(FEB), 1–13. https://doi.org/10.3389/fnhum.2013.00072.

[32] Mardiansyah, A., Syafruddin, & Bakhtiar, S. (2023). Assessment of motor competence in Indonesian elementary school children using the Körper koordinations test Für Kinder (KTK3+) (Body coordination test for children). Journal of Physical Education and Sport, 23(10), 2632–2641. https://doi.org/10.7752/jpes.2023.10301.

[33] Iivonen, S., & Sääkslahti, A. K. (2014). Preschool children's fundamental motor skills: A review of significant determinants. Early Child Development and Care, 184(7), 1107–1126. https://doi.org/10.1080/03004430.2013.837897.

[34] Cohen, K. E., Morgan, P. J., Plotnikoff, R. C., Barnett, L. M., & Lubans, D. R. (2015). Improvements in fundamental movement skill competency mediate the effect of the SCORES intervention on physical activity and cardiorespiratory fitness in children. Journal of Sports Sciences, 33(18), 1908–1918. https://doi.org/10.1080/02640414.2015.1017734.

[35] Syahputra, R., Mardiansyah, A., Hendrayana, A. A., Bakhtiar, S., & Pion, J. (2021). Sistem identifikasi Bakat Dalam Olahraga. In Wineka Media (Edisi Kedu, Vol. 1999, Issue December). Wineka Media.

[36] Syahputra, R., Oktarifaldi, Putri, L. P., & Bakhtiar, S. (2022). Physical Performance Characteristic of West Sumatera Athletes in Combat and Game Sports. International Journal of Human Movement and Sports Sciences, 10(4), 732–747. https://doi.org/10.13189/saj.2022.100414.

[37] Das, R., & Jhajharia, B. (2022). Association between physical fitness and BMI among school going male children. 2, 111–114. https://doi.org/10.33545/27077012.2021.v2.i1b.45

[38] Das, R., Jhajharia, B., & Das, K. (2022). Prediction Model of Success and Failure in Football Competitions Prediction Model of Success and Failure in Football. International Journal of Research Pedagogy and Technology in Education & Movement Sciences, 12. https://doi.org/10.55968/uniaca.2022.11.2.3

[39] Das, R., Jhajharia, B., & Kumar, D. (2021). Analysis isokinetic muscular strength of knee flexors and extensors between bowlers, batsman and wicketkeepers in cricket. 1, 50–53.