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The Relative Age Effect on Physical Fitness among 12 Years Old Children in Malaysia

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Abstract

The purpose of this study was to identify differences in fitness levels between children who are the same age but were born in different birth quartiles. 98 year six students (12 years old) from all around the state of Perak, boys and girls who do not have any unusual health conditions were used for the samples. Based on their quarter of birth, all children were divided into quarters: quarter 1 (q1: born between January and March), quarter 2 (q2: born between April and June), quarter 3 (q3: born between July and September), and quarter 4 (q4: born between October and December). Fitness tests will include body composition measurements (body weight, standing, and sitting heights, and arm span), standing broad jump test, sit and reach test, 30-meter sprint test, handgrip, step test, curl up test, stork stand test, and T-Test. The distribution of the participants was 98 children aged 12 years old (n =31 (31.6%), n = 27 (27.6%), n = 21 (21.4%) and n = 19 (19.4%)), from quarter 1, quarter 2, quarter 3 and quarter 4, respectively. A multivariate analysis of variance (MANOVA) was used to compare four birth quartiles on twelve physical fitness tests. The multivariate test of the differences among the four groups was significant, f(12,85)=.043, Roy's Lambda = 0.272. Children born in the first quarter of the year were found to be more talented than those born in the last quarter.

Keywords: Relative Age Effects, Talent Identification, Physical Fitness, Birth Month Quartiles, Fitness Test

Introduction

Children who were born earlier in the year than those who were born later in the year typically perform better in sports, which is known as the "relative age effect" (RAE) (Bell et al., 1997). Older children in a certain age group are more likely to excel in sports compared to younger children. There may be a year difference between the oldest and the youngest kids in the same age group (Sasano et al., 2020). Players born earlier in the year have a higher chance of being chosen for elite or national teams than players born later in the year. Conversely, players who were born later seem to be forgotten about (Mat-Rasid et al., 2017). Early-year births increase the chance that a child will be considered gifted and that they will be chosen for talent teams or camps, where they will have access to the greatest coaches and facilities (Aune et al., 2017). As a result, the chosen children are given the best growth opportunities, and the decision to choose them initially seems justified given that their performance development in ice hockey is frequently higher than that of non-selected children.

Most elementary or primary schools classify students by age using the cut-off date (Roberts et al., 2012). As a result, there was approximately a year's worth of chronological age between the oldest and youngest students in the same class. As a result, the youngest and oldest students in the same class were separated by over a year in chronological age. It has been demonstrated that in children and adolescents, the difference between birthdates has an impact on motor skill proficiency and cognitive performance (Cupeiro et al., 2020). Práxedes et al. (2017) found that various research concentrating on the RAE in soccer has found that players born in the first months of the year relate to success in this sport (Augste and Lames, 2011; Helsen et al., 2005). A skewed birthday distribution, which implies differences in height, intelligence, and maturity, distinguishes the RAE from other populations. Children who are born later than the entering years for sports are therefore predicted to experience systematic disadvantage throughout their adolescence and into their late teens (Fumarco & Rossi, 2018).

RAE was discovered in U12, U15, and U18 athletes competing in a competition in Malaysia, according to research by (Shah et al., 2020). As a result, the selection bias against players born later in the year is highlighted by the overrepresentation of athletes who were born early in the year. It is believed that the physical advantage of early-born athletes accounts for their overrepresentation and that the selection committee may have passed over talented but physically less advantageous individuals. While Cupeiro et al (2020) found that when children aged 3 to 5 years old were tested using the practical and dependable PREFIT battery, performance increased as the relative age increased. After completing their elementary education, bright students are given access to quality education and specialized sports training in sports schools at both the national and state levels. This allows them to thrive in sports and represent their country at both the junior and senior levels. Bias occurs when students are classified by chronological age during the talent selection procedure for specialized institutions. The cutoff for each selection year in Malaysia's present system is 1 January. The relatively younger children are those who were born after the cut-off date and the relatively older children are those who were born before the cut-off date. Because of the RAE, there are age gaps of almost one year between the oldest and youngest members within a given age group. Particularly around puberty, RAE can cause noticeable differences in a person's physical and cognitive development. This fact means that in comparison to children born later in the selection year, those born in the first quarter of the year are more likely to be recognized as having greater potential.

Significant relative age effects were found in both genders for all age groups in Malaysia when a study looked at the prevalence of the RAE among all the sports played in the Malaysian Schools Sports Council (MSSM) (Low, 2018). Compared to those born in the last quarter of the year, athletes born in the first three months were noticeably overrepresented. This outcome is supported by the chronological age norm that is used to screen out those with less potential when enrolling students in school sports. Children may score worse on performance tests because biological maturity and chronological age rarely advance at the same rate. According to research up to this point, elite youth academies' talent identification and selection procedures tend to aggravate the RAE bias, which is why there is many players born early in the selection year (Ek et al., 2020; Güllich & Cobley, 2017). Although RAE was not scientifically supported, there are theories that athletes may be mistakenly selected due to maturation-related advantages in body size, strength, speed, and endurance rather than actual talent (Bidaurrazaga-Letona et al., 2019). In other words, participants who were born considerably later than the cutoff date are likely to perceive their abilities as being low, which will ultimately result in their dropout. A form of selection that promoted early physical development discredited participants born at the end of the year, which explained the unequal distribution of athletes at the professional level. Because it severely reduces players' prospects of reaching a high level by eliminating those who were born after the cutoff date, it is regarded as having a discriminating effect on the youth categories (Doyle, Bottomley, & Angell, 2017). Therefore, suggestions on reducing this prejudice and understanding the factors that contribute to sport dropout are crucial for the sports federation, which must expand and become self-sustaining.

Advanced statistical modeling has been widely employed in numerous fields, including environmental study (Tripathi & Singal, 2019), corporate marketing (Guirguis, 2019), and digital forensics (Phahlamohlaka & Coetzee, 2018). Given the widespread interest in understanding the individual traits that contribute to long-term performance, higher-dimension models utilizing multivariate analysis have been applied to sports (Barron et al., 2020; Pion et al., 2017; Louzada et al., 2016; Till et al., 2016). By measuring the performance into number ratings, such an approach tends to replace subjective judgment with objective ways. These proposed models, however, imply that talent is static since they neglect several crucial factors, including age and RAE (Wattie, Schorer, & Baker, 2015). Thus, the purpose of this study was to identify differences in fitness levels between children who are the same age but were born in different birth quartiles.

Methodology

Study design

An ex-post facto study, in which it is not possible or acceptable to modify the features of samples, will be used in the research design. The fitness components will be treated as independent variables by the researcher as they explore potential relationships and explanations for describing athletic talent.

Participants

Since this age group is utilized to choose students for both National and State Sports Schools the next year, year six students (12 years old) from all around the state of Perak are used as samples. There are 98 students in the study's overall sample. Boys and girls in year 6 (12 years old) who do not have any unusual health conditions are the inclusion criteria for the samples. Students with special needs are the exclusion criterion. Before starting this study, the Institutional Ethic Committee, the State Education Department (JPN), the District Education Officer (PPD), the administrators of the relevant schools, and the Educational Research Application System (ERAS) will all have given their approval for the data collection. Data collection was done at schools throughout the state of Perak. As a result, the target samples' studies and exam preparation are neither hindered nor interfered with by this study. Before any data was collected, parental and guardian agreement was requested. Children's involvement in the study was entirely voluntary, and they were free to leave at any moment.

Procedure
In this study, fitness tests will include body composition measurements (body weight, standing, and sitting heights, and arm span), the standing broad jump test to assess explosive leg power, the sit and reach test to assess flexibility, the 30-meter sprint test to assess speed, the handgrip test to assess muscular strength, the step test to assess cardiovascular endurance, the curl up test to assess muscular endurance, the stork stand test to assess balance, and the T-Test to assess agility. All the fitness tests are chosen because the Malaysian Ministry of Education has administered the general fitness test for admission to sports schools. Based on their quarter of birth, all children were divided into quarters: quarter 1 (q1: born between January and March), quarter 2 (q2: born between April and June), quarter 3 (q3: born between July and September), and quarter 4 (q4: born between October and December). The stations were used to assign the fitness test. Eleven groups were formed from the participants, and each group had to finish the test. Following completion of the test, each group will go on to the following station to perform a different test, and so on, until all tests have been completed by all groups.

Statistical Analysis
All the collected data were recorded after the process was complete. XLSTAT 2019 software will be used by researchers to descriptively analyze the data (add-on in Microsoft excel 2019 software). The differences in fitness level among the children across the quarter of birth categories (q1. ys. q2. vs. q3. vs. q4.) were evaluated using a multivariate analysis of variance (MANOVA).

Results

Table 1

The means data for each birth quartiles among the children based on physical fitness test.

The distribution of the participants was 98 children aged 12 years old (n =31 (31.6%), n = 27 (27.6%), n = 21 (21.4%) and n = 19 (19.4%)), from quarter 1, quarter 2, quarter 3 and quarter 4, respectively. Based on table 1, Q1 was the highest mean for standing heights among the birth quartiles while Q4 was the lowest mean for standing heights. For leg length, Q1 and Q2 were the highest mean while Q3 and Q4 were the lowest. Next, Q1 was the highest mean for arm span and Q4 was the lowest mean. While for body weight, Q2 was the highest mean for body weight and Q4 was the lowest mean. Based on table above, Q1 was the highest mean for step test, 30M sprint, curl up test, standing broad jump test, sit and reach test, and handgrip test. While Q3 is the highest mean for stork stand test and T-test.

Variable	Quarter 1 (n=31)	Quarter 2 (n=27)	Quarter 3 (n=21)	Quarter 4 (n=19)
Standing Height (Cm)	156.3	155.0	154.2	152.0
Leg Length (Cm)	78.0	78.0	77.0	77.0
Arm Span (Cm)	157.6	155.0	154.6	152.6
Body Weight (Kg)	44.5	45.1	43.4	42.3
Step Test (BPM)	162	153	155	153
30M Sprint (Seconds)	4.38	4.54	4.72	4.80
Curl Up Test (Repetitions)	31	30	28	30
Stork Stand Test (Seconds)	9.40	10.10	10.64	7.33
Standing Broad Jump (Meters)	1.50	1.39	1.42	1.43
Sit and Reach (Cm)	32.7	31.3	29.2	26.2
Handgrip Test (Kg)	24.6	24.0	22.0	22.5
T-Test (Seconds)	12.4	12.5	12.3	13.0

Table 2

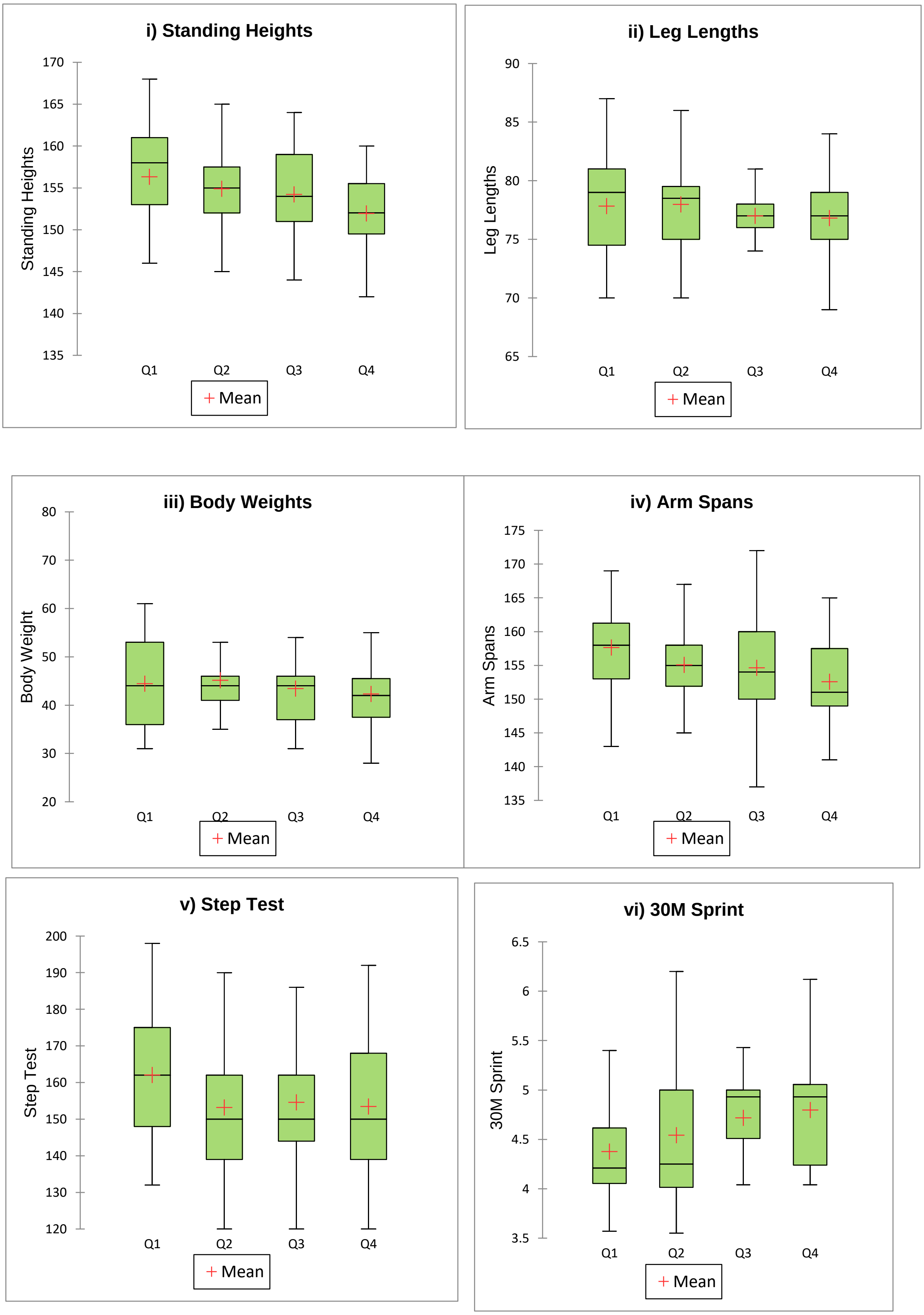
The Multivariate Analysis of Variance (MANOVA)

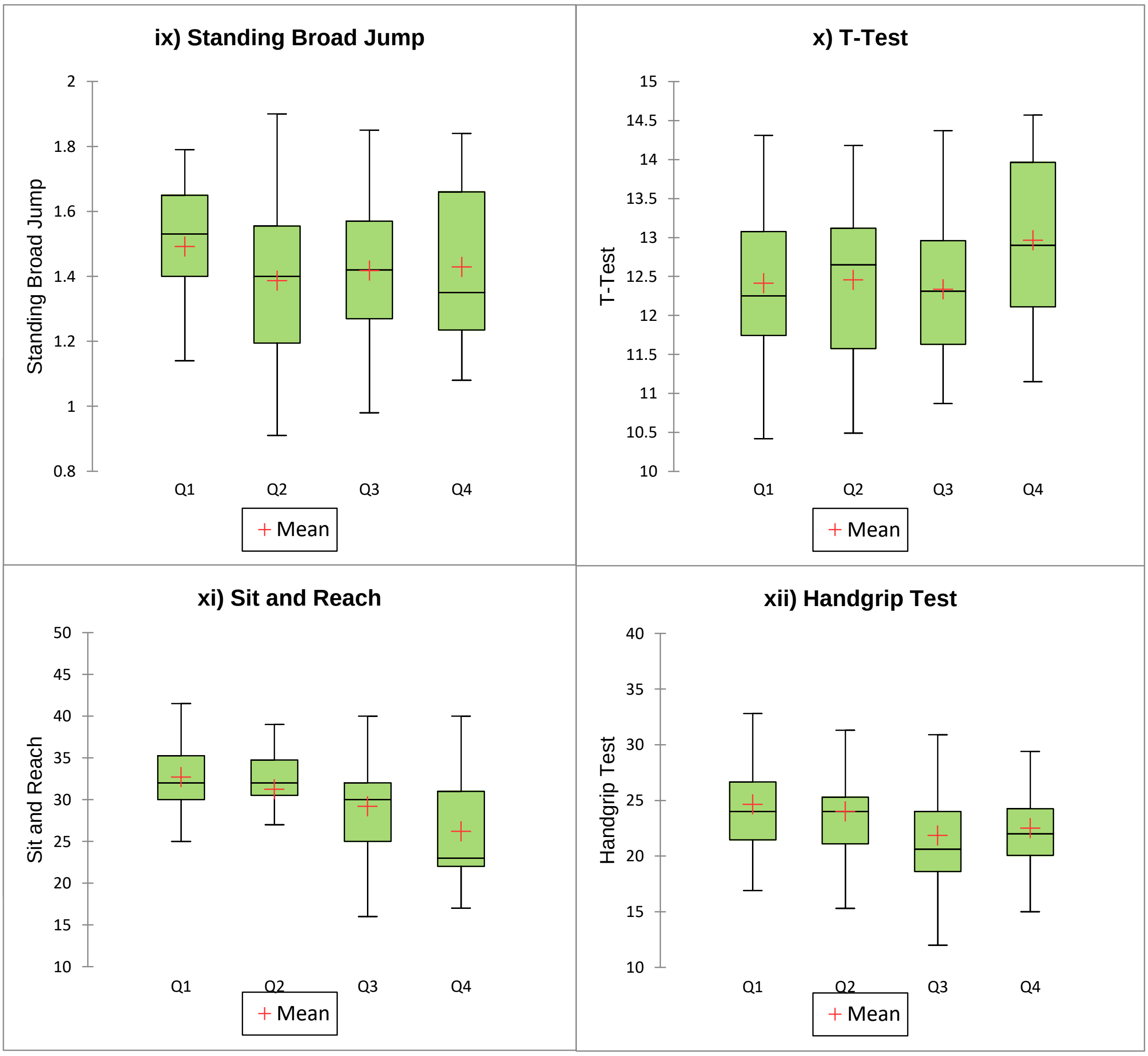
A multivariate analysis of variance (MANOVA) was used to compare four birth quartiles on twelve physical fitness tests. The multivariate test of the differences among the four groups were significant, f(12,85)=.043, Roy's Lambda = 0.272.

Roy's test

	Quartiles
Lambda	0.272
F Observed values	1.923
DF1	12
DF2	85
F Critical value	1.868
p-value	**0.043**

Chart 2: Box Plots





Discussion

The purpose of this study was to differentiate fitness level between children within same age group but different birth quartiles. The overrepresented of children born early of the year were recognized. This finding is confirmed by a study by Patel et al (2019), which found that 49.1% of participants (ages 9 to 16) were born in the first quartile of the selection year. Recent research revealed that 48.6% of all youth players from professional English clubs' academies (Leagues 1 and 2) between the ages of 9 and 18 were born in the first birth quartile. The RAE has been used in England's national teams and academy system. A skewed birthdate distribution, which reflects differences in physical size, cognitive aptitude, and maturity, was also noted by Fumarco & Rossi (2018) in their study as another way to identify the RAE. Because of this, it is anticipated that children who are born after the peak sports entry years will have systemic disadvantages throughout their early years and into their late teens. Although RAE was not empirically tested, there are beliefs that athletes may be mistakenly selected only due to maturation-related advantages in body size, strength, speed, and endurance rather than actual talent (Bidaurrazaga-Letona et al., 2019). Or, to put it another way, participants who were born much later after the cut-off date are likely to have a poorly perceived aptitude, which in turn causes their dropout.

Most elementary or primary schools classify students by age using the cut-off date (Roberts et al., 2012). As a result, there was approximately a year's worth of chronological age between the oldest and youngest students in the same class. The current procedure in Malaysia employs January 1 as the deadline for each selection year. According to Low's (2018) findings, athletes born in the first three months of the year were noticeably overrepresented compared to those born in the final three months of the year. This outcome is unquestionably supported by the chronological age norm that is used to screen out those with less potential when enrolling students in school sports. The multivariate analysis showed that children in the same age group but with different birth quartiles had significantly varied fitness levels, with a p-value of.349 for the analysis. This is contrary to the findings of Cupeiro et al. (2020), who claimed that performance increased with relative age. The age ranges studied are likely the cause of the discrepancies in our data. It is crucial to note that the sample in the research described above was significantly younger than our sample, ranging in age from 3 to 5.

Conclusion

Relative age effects (RAE) are shown to exist in Perak children in this study. Children born in the first quarter of the year were found to be more talented than those born in the last quarter. By recognizing the requirements or objectives in each discipline, adults may account for the occurrence of this effect in their interactions with children and create concessions for it. This is so that kids can eventually attain the same level as their older counterparts (Bell & Daniels, 1990). By regulating and being aware of the constraints (individual, task, and environmental) and their connections, which affect the existence of RAE, it is important to reduce this effect as soon as feasible given that RAE exists even at the time of sports choosing (Wattie et al., 2015). We worry that the current study sample, which primarily focuses on the Perak state, may not be a good reflection of Malaysia due to its constraints. Thus, most of the Malaysian youth could benefit from these findings, even though they may not apply to all of them and may require further study in the future. Another drawback of this study is that we neglected to examine factors like the sample's experiences that might help to explain RAE at this age.

The findings of the present study can be valuable for coaches and sports managers to determine the RAE that exist on physical fitness performance among children 12 years old in Malaysia. From the findings of the present study also, the coaches and sports manager can choose the most significant performance related indicators necessary for successful performance of athletes in various sports and to assist in predicting potential future athletes. The identification and development of elite athletes is a long-term process and requires concerted effort from all stakeholders involved in sport. Hence, this study is in line with the National Sports Policy by maximizing the resources of young talented athletes, improved the economy of the country and providing a return on investment in nation building through sport. It is documented in the National Sports Policy that the identification of young talents in sports is essential to make sports a culture among Malaysians. It is also the government's policy to develop sport as an industry through making sports a career, manufacturing, and commercialization of sports equipment. This effort will generate income and provide return of investment to the government.

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