TOPICS IN EXERCISE SCIENCE AND KINESIOLOGY

Implementation Strategies

Effects of Birth Month on Talent Identification Participation and the Identification Process in Sports

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ABSTRACT

Topics in Exercise Science and Kinesiology Volume 2: Issue 1, Article 7, 2021. The purpose of this study was to clarify the effect of the birth month on Talent Identification (TI) participation and the identification process in sports. The subjects were 4th grade elementary school children (mean age, 9±5.8 years) who participated in the Talent Identification Project. The method of identification was two-stage. In the first stage, the 30 m sprint, standing broad jump, and medicine ball front throw (1 kg) were performed, and 99 boys and 97 girls with high overall scores were selected to participate in the second stage. In the second stage, in addition to the results of the first stage, the T-test, 20 m shuttle run, standing triple jump, rebound jump (RJ-index), medicine ball back throw (1 kg), and repeated horizontal jump were performed. In the T-test, subjects run straight to a point 10 m ahead, then, ran 5 m to the right, 10 m to the left, 5 m to the right, and returned 10 m back to the start. A total of 15 boys and 15 girls with high overall scores were selected from the second stage. As in a previous study, the birth month was divided into yearly quarters (1, April to June; 2, July to September; 3, October to December; and 4, January to March). Point of application #1: There was a bias in participation rates and final members in the TI project for 4th graders by birth month for both boys and girls. Point of application #2: In the case of 4th grade boys of the TI project, the medicine ball front throw, as an index of whole body power, was influenced by the birth month. Point of application #3: It was speculated that boys born between January and March had a smaller morphology (height and weight), and were disadvantaged in measurement tests related to morphology, such as the medicine ball front throw.

KEY WORDS: Medicine ball throw, child, physical fitness

INTRODUCTION

In sports powerhouses, Talent Identification (TI) has been used to identify children who are likely to succeed in sports in the future (1, 2). There are various methods for identifying these

children, but methods of measuring individual morphology and physical fitness such as height, weight, strength, speed, and endurance ability to evaluate the physical properties of the athlete have been used often (3). However, the maturation process of children varies greatly among individuals (4), and results differ greatly depending on the point of the child in development. On the other hand, in school education, it has been reported that children born before and after the grade change date may have an age difference of up to one year, resulting in various developmental differences (relative age effects) (5, 6). In addition, relative age effects have been reported to affect children's physical competence (7). Therefore, relative age effect may impact the rate of participation in TI and the results of TI. The purpose of this study was to clarify the effect of birth month on TI participation and the identification process in sports.

METHODS

Subjects were 4th grade elementary school children who participated in the TI Project in Saitama Prefecture, Japan in 2015. This project was targeted to this age in children with reference to the competition start age of Olympic athletes and target age of other TI programs (8). This project supposed to selected about 100 boys and 100 girls in the first stage, and selected about 15 boys and 15 girls in the second stage in descending order of score. All results were converted to deviation values. The physical assessment was performed in two stages, with 668 boys and 552 girls participating in first stage, and 99 boys and 97 girls selected to move to the second stage. From the second stage results, 15 boys and 15 girls were selected. The measurement items were the 30 m sprint, standing broad jump, and medicine ball front throw (1 kg) in the first stage, and, in the second stage, in addition to the results of the first stage, the T-test*, 20 m shuttle run, standing broad jump, rebound jump (RJ-index), medicine ball back throw (1 kg), and repeated horizontal jump (20 sec) in the second stage. Height and weight were measured as reference data. As in a previous study (9), the birth month was divided into yearly quarters (Group 1, April to June; Group 2, July to September; Group 3, October to December; and Group 4, January to March). The bias of the birth month was analyzed using chi-square test and the results of each physical fitness were analyzed using one-way ANOVA. The significance level was set to less than 5%. As a result, there was a bias observed in the participation in the TI project by birth month that affected the final results of both boys and girls. In particular, in the case of boys, the small morphology (height and weight) of children born from January to March compared to those born in later quarters may affect their physical fitness, as indicated by the medicine ball front throw.

POINTS OF APPLICATION

1. There was a Bias in the Participation Rate and Those Selected in the TI Project by Birth Month

The first stage was free participation. However, significantly fewer children born from January to March participated in the TI than that of 4th graders in general*, and the participation of girls from April to June was significantly higher than that of the general 4th graders ($p < 0.05$). In the second stage, the children selected in the first stage participated, however the number of girls

born in January to March was significantly less than that of the general 4th grade participation ($p < 0.05$). The final selection included more children born in April to June, and none of the girls were born in January to March ($p < 0.05$). This study did not investigate whether children's participation in the TI project was due to the will of the parents or the will of the children. Hancock et al. (2013) presented a model in which the birth month influences parents' expectations of their children and their own expectations of themselves (10). It is inferred that the results of this study had a similar background. As a result, it became clear that the birth month affects both boys and girls in the initial participation rate to TI to the final selection.
* in general indicates the distribution of birth months of 4th graders overall, quoted from a current population survey of Japan (11).

Table 1. Birth month and number of children in the first stage, second stage, and selected by TI.

	Birth month				vs. General	P-value (residual analysis)							
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	P-value	Apr-Jun		Jul-Sep		Oct-Dec		Jan-Mar	
	Group 1	Group 2	Group 3	Group 4	all group	Adjusted residual	P-value	Adjusted residual	P-value	Adjusted residual	P-value	Adjusted residual	P-value
First stage													
Boy (n, %)	185 , 27.7	193 , 28.9	156 , 23.4	134 , 20.1	**0.010**	1.903	0.057	1.711	0.087	-0.812	0.417	-2.823	**0.005**
Girl (n, %)	158 , 28.6	162 , 29.3	127 , 23.0	105 , 19.0	**0.003**	2.237	**0.025**	1.799	0.072	-0.927	0.354	-3.131	**0.002**
Second stage													
Boy (n, %)	25 , 25.5	31 , 31.6	20 , 20.4	22 , 22.4	0.534	0.226	0.821	1.274	0.203	-0.987	0.324	-0.534	0.594
Girl (n, %)	28 , 28.9	31 , 32.0	23 , 23.7	15 , 15.5	0.138	0.993	0.321	1.341	0.180	-0.228	0.820	-2.124	**0.034**
Selected members													
Boy (n, %)	8 , 50.0	6 , 37.5	1 , 6.3	1 , 6.3	**0.024**	2.368	**0.018**	1.050	0.294	-1.712	0.087	-1.717	0.086
Girl (n, %)	8 , 50.0	6 , 37.5	2 , 12.5	0 , 0.0	**0.019**	2.368	**0.018**	1.050	0.294	-1.132	0.258	-2.296	**0.022**
General (2005)													
Boy & Girl (n, %)	260597 , 24.5	276136 , 26.0	262539 , 24.7	263258 , 24.8	reference	reference							

Data Display： n, %.
P-value： chi-squared test

2. The Medicine Ball Front Throw of 4th Grade Boys was Influenced by the Birth Month

As a result of the first stage, boys' medicine ball front throws were significantly better for children born in July-September than for children born in January-March ($p < 0.05$). In addition, there was no statistical difference in the 30 m run and the standing long jump by birth month. Medicine ball throw is an item measured as an index of whole-body power (12). Although height and weight were not measured in the first stage, whole body power was influenced by the birth month.

Table 2. Comparison of each physical fitness according to the difference in the birth month in the first stage.

	Birth month				P-value	P-value (Tukey Kramer)					
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar							
	Group 1	Group 2	Group 3	Group 4	for all	1 vs. 2	1 vs. 3	1 vs. 4	2 vs. 3	2 vs. 4	3 vs. 4
Boy											
n	185 , 27.7	193 , 28.9	156 , 23.4	134 , 20.1	-	-	-	-	-	-	-
30 m sprint (s)	5.9 ± 0.4	5.9 ± 0.4	6.0 ± 0.4	6.0 ± 0.4	0.637	0.999	0.869	0.804	0.792	0.719	0.999
Medicine ball front throw (m)	5.8 ± 0.8	5.9 ± 0.9	5.7 ± 0.9	5.6 ± 0.8	**0.016**	0.960	0.258	0.132	0.093	**0.042**	0.978
Standing broad jump (cm)	158.3 ± 15.3	159.8 ± 15.1	157.9 ± 15.9	158.2 ± 14.9	0.658	0.794	0.994	1.000	0.661	0.809	0.997
Girl											
n	158 , 28.6	162 , 29.3	127 , 23.0	105 , 19.0	-	-	-	-	-	-	-
30 m sprint (s)	6.0 ± 0.4	6.1 ± 0.3	6.1 ± 0.4	6.1 ± 0.4	0.647	0.942	0.583	0.894	0.880	0.997	0.966
Medicine ball front throw (m)	5.6 ± 1.0	5.6 ± 0.9	5.5 ± 0.9	5.4 ± 0.9	0.441	0.992	0.828	0.662	0.675	0.500	0.989
Standing broad jump (cm)	156.1 ± 15.2	157.5 ± 14.2	155.1 ± 15.9	155.7 ± 15.2	0.571	0.836	0.945	0.997	0.533	0.779	0.990

Data Display： n, %； mean ± sd.
P-value： One-way analysis of variance、Tukey-Kramer method

3. The Height and Weight of Boys in the 4th Grade were Affected by the Birth Month

In terms of height, boys born between January and March were significantly shorter than those born between April and June and those born between July and September ($p < 0.05$). In terms of body weight, boys born between January and March were significantly lighter than those born between April and June ($p < 0.05$). In girls, there was no significant difference in any item depending on the birth month. It was suggested that the small morphology of children born from January to March may affect their whole physical power, as indicated in the medicine ball front throw. Our results suggest that when identifying talented children, the participation rate is biased depending on birth month, and it is necessary to pay attention to the relationship between morphology, such as height and weight, and measurement tests.

Table 3. Comparison of each physical fitness according to the difference in the birth month in the second stage.

	Birth month					P-value (Tukey Kramer)					
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	P-value						
	Group 1	Group 2	Group 3	Group 4	for all	1 vs. 2	1 vs. 3	1 vs. 4	2 vs. 3	2 vs. 4	3 vs. 4
Boy											
n	25 , 25.5	31 , 31.6	20 , 20.4	22 , 22.4	-	-	-	-	-	-	-
30 m sprint (s)	5.5 ± 0.2	5.5 ± 0.2	5.5 ± 0.2	5.6 ± 0.2	0.695	0.981	0.852	0.690	0.963	0.861	0.994
Medicine ball front throw (m)	6.6 ± 0.6	7.0 ± 0.9	6.8 ± 0.4	6.6 ± 0.6	0.123	0.163	0.864	>0.999	0.661	0.186	0.871
Repeated horizontal jump (rep)	49.4 ± 3.8	49.0 ± 4.9	50.0 ± 4.1	50.0 ± 4.0	0.789	0.982	0.967	0.964	0.837	0.825	>0.999
Standing broad jump (cm)	176.8 ± 7.4	179.5 ± 10.7	178.1 ± 6.4	177.1 ± 8.3	0.655	0.663	0.961	>0.999	0.943	0.751	0.981
Standing triple jump (cm)	510.7 ± 24.1	509.9 ± 20.4	513.2 ± 28.5	502.2 ± 24.1	0.470	>0.999	0.986	0.620	0.966	0.653	0.453
Rebound jump (RJ-index)	1.4 ± 0.2	1.5 ± 0.3	1.5 ± 0.3	1.5 ± 0.3	0.325	0.496	0.470	0.357	0.997	0.983	0.999
Medicine ball back throw (m)	7.0 ± 0.9	7.2 ± 1.1	6.8 ± 0.6	6.6 ± 1.1	0.085	0.760	0.950	0.425	0.452	0.059	0.792
T-test (s)	12.8 ± 0.6	12.7 ± 0.7	12.6 ± 0.4	12.7 ± 0.5	0.837	0.953	0.794	0.973	0.965	>0.999	0.963
20 m shuttle run (rep)	76.5 ± 13.2	75.7 ± 16.8	79.1 ± 17.2	73.8 ± 13.7	0.734	0.997	0.944	0.931	0.870	0.970	0.683
Height (cm)	138.9 ± 4.5	137.5 ± 6.1	137.2 ± 2.6	133.7 ± 3.6	**0.002**	0.651	0.616	**0.001**	0.998	**0.023**	0.074
Weight (kg)	32.4 ± 4.5	31.5 ± 3.8	30.4 ± 1.9	29.5 ± 2.9	**0.030**	0.791	0.253	**0.026**	0.705	0.158	0.802
Girl											
n	28 , 28.9	31 , 32.0	23 , 23.7	15 , 15.5	-	-	-	-	-	-	-
30 m sprint (s)	5.6 ± 0.2	5.7 ± 0.2	5.7 ± 0.2	5.6 ± 0.2	0.602	0.869	0.738	0.994	0.989	0.803	0.679
Medicine ball front throw (m)	6.7 ± 0.8	6.7 ± 0.6	6.8 ± 0.8	6.7 ± 0.6	0.970	>0.999	0.995	0.992	0.988	0.996	0.963
Repeated horizontal jump (rep)	50.5 ± 3.2	48.9 ± 4.3	49.0 ± 4.6	50.1 ± 3.6	0.396	0.437	0.559	0.989	>0.999	0.788	0.850
Standing broad jump (cm)	173.6 ± 9.2	174.5 ± 8.6	176.7 ± 12.3	173.8 ± 10.7	0.726	0.986	0.707	>0.999	0.868	0.996	0.829
Standing triple jump (cm)	507.7 ± 29.2	505.5 ± 28.1	507.7 ± 37.7	510.3 ± 25.2	0.966	0.992	>0.999	0.993	0.994	0.958	0.994
Rebound jump (RJ-index)	1.6 ± 0.3	1.6 ± 0.2	1.7 ± 0.4	1.7 ± 0.3	0.635	0.921	0.925	0.987	0.606	0.823	0.997
Medicine ball back throw (m)	6.2 ± 1.1	6.4 ± 1.2	6.6 ± 1.2	6.2 ± 0.7	0.574	0.981	0.581	>0.999	0.780	0.984	0.674
T-test (s)	13.1 ± 0.6	13.1 ± 0.5	13.3 ± 0.6	13.1 ± 0.6	0.555	>0.999	0.636	>0.999	0.566	>0.999	0.735
20 m shuttle run (rep)	66.5 ± 11.5	66.9 ± 11.1	60.1 ± 11.1	64.0 ± 12.9	0.144	0.999	0.207	0.909	0.145	0.853	0.736
Height (cm)	139.3 ± 4.7	139.5 ± 5.6	140.8 ± 6.5	140.5 ± 8.2	0.789	>0.999	0.811	0.935	0.860	0.960	0.998
Weight (kg)	32.2 ± 4.4	31.6 ± 4.0	33.0 ± 4.3	33.2 ± 5.4	0.575	0.950	0.917	0.899	0.649	0.660	>0.999

Data Display： n, % ； mean ± sd.

P-value： One-way analysis of variance、Tukey-Kramer method

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