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Indonesian and American Children: Object Control Skills Comparison

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Abstract--- *Empirical findings have shown the contribution of fundamental motor skills, particularly object control skills, on physical skill levels of children as they age. However, many countries across the globe, including Indonesia, currently does not have a basic understanding of children's fundamental motor skill profiles yet. Therefore, this study is aimed to capture the profile of Indonesian children's object control skills based on data from American children. Participants were 145 Indonesian children, aged 5 and 6 years (44.5% boys). Children's object control skills were measured by using stages of developmental sequences of manipulative skills. Data from Indonesian children were compared to Age-Related Changes in Fundamental Motor Skill of American, which is a guideline about the age at which 60% of children perform motor skills at a specific stage. Comparative analysis showed that Indonesian children followed American children on catching and kicking development for boys. However, Indonesian boys showed lower stages on striking (71% of 5-year old boys showed stage 2) and throwing (48% of 6-year old boys showed stage 1), than American children (stage 3 and 5 consecutively). Furthermore, Indonesian girls showed lower stages in all object control skills, except kicking (89% of 5-year old girls showed stage 3), while 60% of 5-year old American children would perform stage 2 in kicking.*

Keywords--- *Object Control Skills, Skills Comparison, Fundamental Motor Skills, Motor Competence, Children.*

I. INTRODUCTION

Fundamental motor skills are the basic pattern of movements to support more advance movement in sports and daily activities categorized into locomotor skills, object control skills, and stability skills1. Locomotor skills are skills that move the body from one point to another point in space, such as running, galloping, skipping leaping, hopping, sliding, and jumping.

Object control skills are the ability to manipulate an object with either the hands or feet, such as throwing, catching, hand dribbling, striking, and kicking. Stability refers to the ability to gain and maintain equilibrium to the force of gravity during movement, such as twisting, pulling, pushing, and turning1. Research has shown the essence of fundamental motor skills for children to physical activity participation throughout their life2,3,4.

To promote children's fundamental motor skills, we need to understand how motor skills develop. Clark and Whitall (1989) explained that motor skill development refers to changes in motor behavior, and the processes underlie the changes over the lifespan5. The motor development process begins in utero, continues throughout the lifespan, and concludes with death. A "Sequential Model of Motor Development" explains that fundamental motor skills come after reflexes and reactions development phase, and they need to be mastered in order for an individual to break through the technical proficiency barrier to develop the translational motor skills6. Some recent studies

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supported the need for individuals to acquire a certain level of competence needed in order to maintain to participate in physical activity and movement behaviors across the lifespan7,8. Additionally, an "Hourglass model" highlights the influence of heredity and environment in the development of motor skills1, and the "Mountain of Motor Development" recognizes that fundamental motor skill development is different within one individual (intra-individual) and between individuals (inter-individual)9. These models also point out the different journeys that individual experiences during motor development9 influenced by heredity and environment1.

Research findings have shown that object control skills predict physical activity participation in later life2,10. Empirical data have shown a global trend that boys outperformed girls in object control skills. Meanwhile, there was no gender difference in children locomotor skills2,11,12,13. Fundamental motor skills in these studies were measured by using the Test of Gross Motor Development-the second version14 or the third version15. Another way to identify children's fundamental motor skills is by using stages in developmental sequences of fundamental motor skills. Stages in fundamental motor skills represent the typical patterns of movement that provide choices for children in a given movement context2. Stages in fundamental motor skills range from three to five stages, depend on the complexity of the skills. In the USA, comprehensive studies were able to provide the changes in developmental sequences of fundamental motor skills related to age and gender2,16,17,18, which is presented into a chart (see Figure 1.)

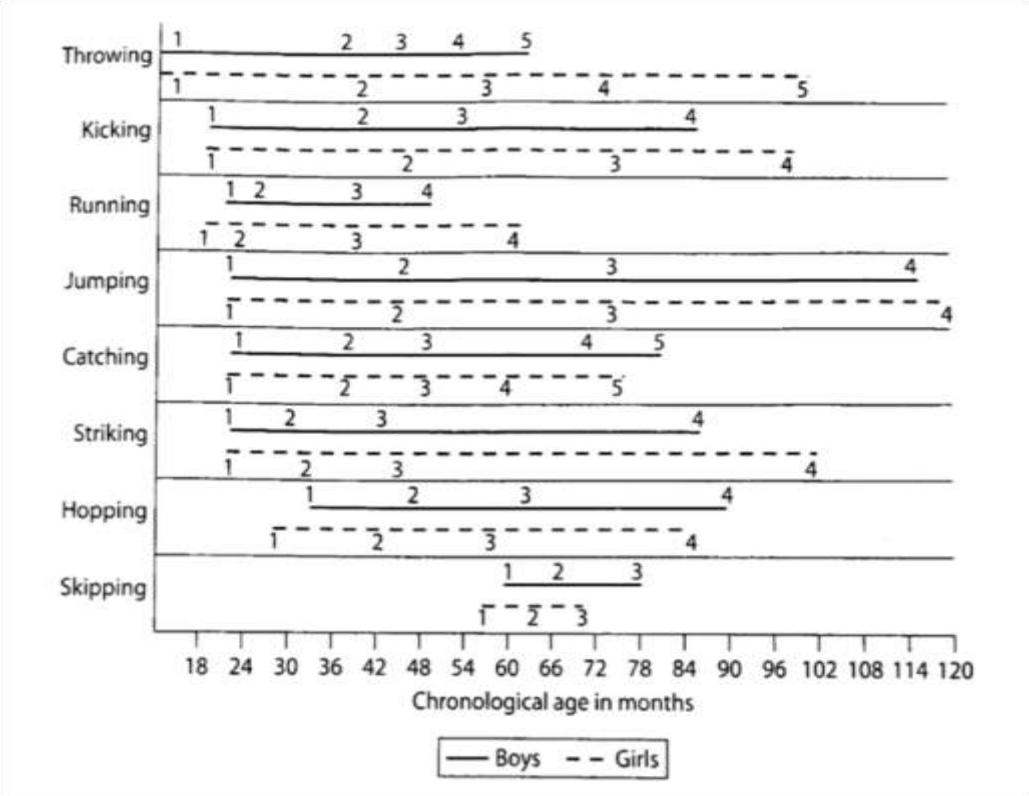

Figure 1: Changes in Fundamental Motor Skill Development Related to Age and Gender

Figure 1 shows that on average (around 60%), children in a specific age and gender will perform a particular stage of fundamental motor skills. However, some children will show some delays or more advance in their stage of

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motor development2. Research has found that fundamental motor skills cannot develop naturally in children19,20. They should be appropriately and systematically taught to children2,21. Therefore, it is essential to understand the pattern of children's fundamental motor skill development. As different environments, including region and culture, may have a different influence on children's development2, it is essential to identify the pattern of children's fundamental motor skills in comparison to children from another country. Recent studies in Indonesia11 measured Indonesian children's fundamental motor skill competence by using the Test of Gross Motor Development14,15. To the author's knowledge, no study compared the pattern of fundamental motor skill developmental sequences of Indonesian children in comparison to children in other countries.

II. METHODS

This study involved 145 Indonesian children, aged 5 years (n=73; girls=42) and 6 years (n=72; girls=38). These participants were enrolled in four kindergarten centers in an urban city in West Sumatera. This study investigated the stages of object control skills of participants measured by using stages of developmental sequences of manipulative skills2. Children were videotaped performing three trials of four object control skills (i.e., throwing, kicking, catching, and striking). The performance criteria for each skill coded by a trained observer of the videotape to determine the stage of each object control skill. The stages that were shown at least twice out of three trials recorded for analysis. The score ranges from 0-5 points for each object control skill. Data were analyzed using IBM SPSS Statistics 23, and statistical significance set at $p < .05$ Descriptive analyses were conducted. In order to test our hypothesis, one-sample t-tests were run for each object control skill by age (5 and 6 years) and gender (boys and girls). The test values were assigned based on the values presented in the developmental sequences of fundamental motor skills related to age and gender (Figure 1).

III. RESULTS

Descriptive data of the percentage of participants in each stage of object control skills are presented in Table 1.

Table 1: The Percentage of Participants in Each Stage of Object Control Skills by Gender and Age

Object Control Skills	Stages	5 Years of Age		6 Years of Age	
		Boys (%, n=31)	Girls (%, n=42)	Boys (%, n=34)	Girls (%, n=38)
Strike	1	22.58	45.24	35.29	39.47
	2	70.97	42.86	41.18	52.63
	3	3.23	9.52	5.88	5.26
	4	3.23	2.38	17.65	2.63
Catch	1	0.00	0.00	0.00	0.00
	2	0.00	11.90	2.94	2.63
	3	41.94	54.76	26.47	44.74
	4	58.06	33.33	67.65	50.00
	5	0.00	0.00	2.94	2.63
Kick	1	0.00	2.38	2.94	7.89
	2	9.68	9.52	2.94	15.79
	3	80.65	85.71	76.47	73.68
	4	9.68	2.38	17.65	2.63
Throw	1	38.71	50.00	41.18	39.47
	2	3.23	7.14	8.82	10.53
	3	25.81	40.48	29.41	36.84
	4	29.03	2.38	20.59	13.16
	5	3.23	0.00	0.00	0.00

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It was found that the majority (>60%) of 5-year-old boys performed stage 2 in striking, and stage 3 in kicking. More than 60% of 6-year old boys performed stage 4 in catching, and stage 3 in kicking. On the other hand, more than 60% of 5-year and 6-year old girls performed stage 3 in kicking.

In order to compare the pattern of object control skills between Indonesian and American children, one-sample t-tests on object control skill patterns or stages were conducted (see Table 2). It was found that 5-year and 6-year old Indonesian boys and girls performed significantly lower ($p < .001$) on throwing and striking stages than American children of the same age. However, there was no significant difference between 5-year and 6-year old Indonesian boys and American boys on the pattern of kicking. Moreover, 5-year and 6-year of Indonesian girls performed significantly better ($p < .001$) stage in kicking than American girls in the same age. However, 5-year old Indonesian boys showed significantly better ($p < .001$) stage in catching than American boys.

Table 2: Comparison of Object Control Skill Stage of Indonesian and American Children

Object Control skills	Gender	5-year old (n=73)					6-year old (n=72)				
		Indonesia	USA	*t*	*df*	*p*	Indonesia	USA	*t*	*df*	*p*
Throwing	Boys	2.53	4.00	-6.29	30	<.001	2.31	5.00	-12.94	33	<.001
	Girls	1.99	3.00	-6.72	41	<.001	2.22	4.00	-9.66	37	<.001
Kicking	Boys	3.02	3.00	.00	30	1.00	3.09	3.00	.90	33	.374
	Girls	2.88	2.00	12.61	41	<.001	2.70	2.00	6.70	37	<.001
Catching	Boys	3.57	3.00	6.44	30	<.001	3.67	4.00	-3.52	33	.00
	Girls	3.20	4.00	-7.89	41	<.001	3.54	4.00	-5.53	37	<.001
Striking	Boys	1.87	3.00	-10.16	30	<.001	2.06	3.00	-5.12	33	<.001
	Girls	1.66	3.00	-11.34	41	<.001	1.74	3.00	-11.65	37	<.001

Note: the stage of object control skills for USA children were based on stages of developmental sequences of manipulative skills2; the stage of object control skills for Indonesian children were the mean of each object control skill stage.

IV. DISCUSSIONS

The primary aim of this study was to compare the pattern of object control skills between young Indonesian children and young American children. Our data showed the evidence that Indonesian children performed approximately 1 stage lower than American children on throwing and striking skills. However, this study found that Indonesian girls performed kicking better than American children of the same age.

The differences in object control skill pattern between Indonesian and American children in this study could potentially be attributed to the difference of environment22, including culture and society values, between Indonesia and the USA. Findings from our study are similar to findings from a study that compared USA children with Belgium children23. Even though both studies measured motor skills with different instruments, the findings among these studies indicate that there was a global trend that environment and regions influence the development of fundamental motor skills. School programs, social values, and policies on physical activity could be critical factors that influence children's motor development23. Participants in this study were Indonesian. During this study was conducted, there were no physical activity guidelines established in Indonesia yet.

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Meanwhile, in the USA, there has been a physical activity guideline in place24. This guideline includes the importance of fundamental motor skill development during childhood, which could influence society's awareness of motor development in the USA. Additionally, the influence of environment in motor skill development can be seen in the significant difference in the pattern of kicking, in which Indonesian girls performed higher stages in kicking than American children in both ages. In Indonesia, soccer is seen as a community sport, which plays a vital role in social interaction and politics25. Therefore, this social value on soccer in Indonesia could explain the finding in this study, in which Indonesian girls performed a more mature stage in kicking than American girls of the same age. Overall, this study confirmed that there was a significant difference in object control skill patterns between Indonesian and young American children. Therefore, it is essential to consider this situation when designing an appropriate motor skill program for children in Indonesia

Despite the findings in this study, there are some limitations to this study that need to be considered. Future study needs to recruit participants that can represent the diversity in Indonesia. Another limitation is the comparison analyses conducted in this study using the value from published data. Future research should consider comparing children's motor skill development between Indonesian and American children using collected data in both countries with a larger sample size and age range.

V. CONCLUSIONS

To conclude, this study has provided evidence that the pattern of object control skill stages performed by Indonesian and American children was significantly differenced. Both 5-year and 6-year Indonesian boys and girls performed lower stages in throwing and striking than their counterparts in the USA. However, Indonesian girls performed higher stage in kicking than American girls, and 5-year old Indonesian boys performed higher skill in catching than their counterparts in the USA.

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