Original Article

Level of motor skill development of preschool students

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Published online: October 30, 2016

(Accepted for publication October 23, 2016)

DOI:10.7752/jpes.2016.s2175

Abstract :

Purpose : The research aims to identify the level of motor skill development among preschool students in Putrajaya. **Methodology :** The ex post facto research involves 120 six year old preschool children (60 males and 60 females) using Ulrich motor skill assessment (Ulrich, 2000) to measure locomotor and ability to control object based on the Gross Motor Development Quotient (GMDQ) scores. The scores were further analyzed using ANOVA to compare differences in motor performances of preschool students among various preschool centers. **Result :** The findings showed significant differences in GMDQ scores [$F(2,117) = 7.8, p < .05$] between government and private students compared to KEMAS preschools students. The age equivalence locomotor score (AEL) with age equivalence measure (AEM) showed a significant difference between government preschoolers with private preschoolers for AEL [$F(2,117) = 3.41, p < .05$] and AEM [$F(2,117) = 7.39, p < .05$] and KEMAS preschoolers. **Findings and discussion :** In term of motor skills development among children in the government, private and KEMAS preschools, results showed children in private preschools scored the highest with KEMAS preschools scored highest for AEM. The results also showed a delay in mastering both locomotor (5 to 8 months delay) and controlling objects (10 to 19 months delay) skill among preschool children. The research suggests knowledge of identifying gross motor skills of preschool children needs to be included in preschool teacher's training curriculum. At the same time, more comprehensive and systematic physical activities should be designed according to the age equivalent to ensure better locomotor development among preschool children regardless where they are either in the government or private preschool centers.

Key words: Gross motor skills, locomotor, object control, preschool

Introduction

Motor development is a continuous process that occurs through out our lives (Gallahue & Ozmun, 2006). The process involves age, physical growth and physiological, motor and nerve systems. If at an early stage of life a person does not go through the normal growth development that person will experience failure in motor skill later in life. As children that person will participate less in sport and games activities (Hardy, 2009). Motor skill can be divided into two components which are gross motor skill and fine motor skill (Arasoo, 1989). Gross motor skill involves the usage of a group of big muscle which provides the main energy to each movement an individual make in performing daily activities. Gross motor skill is a process to build up big muscles such as arm, leg and neck (Taber, 2009). Among the movement involving these muscles are climbing, dancing, running and jumping. Fine motor skill is the usage of small muscles in a coordinated movement mainly finger and eye coordination which improves with growth (Magill, 2001). Physical education is an important subject in developing the children motor development at the early stage and it will give students the opportunities to form and develop their motor skills (Barton, Fordyce & Kirby, 1999). According to the National Standards for Physical Education (NASPE, 2004), various studies showed that a person motor skills in childhood might improve by participating in sports and games

Individual participation in repetitive physical activities even with medium intensity can reduce the risk of obtaining various forms of disease from cardiovascular to osteoporosis or obesity. Frequent physical activities can help a person to manage stress efficiently, alleviate restlessness and depression and increase self-confident. As a result it will help to create better social interaction and community integration (Bauman, Bellew, Vitap, Brown & Owen, 2002). Children gross motor development is important because if motor development is not taken seriously at the early stage of life, it will make children less interested in doing physical activities later in life. Eventually, children will develop low self-esteem which leads to other health issues in the process of becoming an adult (Brown, Walkley & Holland, 2004). Local research also shows that the levels of gross motor skills among children in Malaysia does not follow the supposedly chronological age (Borhanuddin, Saidon & Aris Fazil, 2009). There is a lack of information on the development of gross motor skill development among preschool children in Malaysia, and no research has being carried out on preschool children. Thus, the purpose of this study is to identify the level of gross motor development of preschool children in Malaysia.

Material & Methods

This ex post facto research aims to identify the different level of gross motor development among 6 year old preschool children age in various kindergarten centers. The stratified random sampling method was used to select 120 children from government, private and KEMAS preschool centers in Putrajaya as research samples.

To measure the levels of gross motor development among the samples, Gross Motor Development Test by Ulrich (2000) was used. The test consisted of two aspects of skills which were locomotors skill test (6 items) and object control test (6 items). The tests were suitable to study the gross motor skill of children ages from 3 to 10 years and 11 months. Among the equipment used were video cameras, basketball, batting T, batting, soccer ball, softball and tennis ball.

Data on the level of gross motor development was done using i) a set of video recorder (Sony Handycam), ii) a tripod, iii) a Lenovo lab top, iv) skittle, v) measurement tape, vi) 4 inches rubber ball, vii) basketball, viii) bean bag, ix) batting tee, x) plastic bat, xi) soccer ball, xii) softball, xiii) tennis ball, xiv) Ulrich Gross Motor Development Test form. Prior to the test, personal detail of the participants such as chronological and developmental age was recorded. Warm up and demonstration sessions were conducted by an instructor. Each movement made by the participants was recorded using a video camera for scoring purposes. Locomotors skill test was carried out followed by object control test. Scores were measured based on either the movement existences. A score of 0 was assigned for no movement made and a score of 1 was assigned when there was movement. The total score for gross motor skill was at 48.

Scores recorded were total up in form of standard deviation value. The method to obtain the standard deviation value was as followed: (i) obtain the raw score of locomotors and object control skills tests, (ii) determine the total score for both locomotors and object control skills, (iii) add in the total standard score for both skill tests, (iv) change both scores to percentile score of GMDQ, (v) Value Quotient (GMDQ) less than 100 shows gross motor development at the level of below average whereas value more than 100 indicates that better gross motor development

Result

Levels of Gross Motor Development

GMDQ scores were analyzed descriptively to get the mean and standard deviation value for each preschool centers (Table 1). Based on the analysis, the mean score for private preschool was the highest with a score of 88.08 (SD=7.61). Mean score for KEMAS preschool was at 86.43 (SD=6.89) and followed by government preschool at 82.23 (SD=5.78).

Table 1: Descriptive Statistical of GMDQ Score for All Preschool Centers

Variables	Preschool Centers	N	Mean	Standard Deviation
GMDQ	Government	40	82.23	5.78
	Private	40	88.08	7.61
	KEMAS	40	86.43	6.89

Based on ANOVA analysis, there was a significant difference ($p < 0.05$) for GMDQ scores between the three preschool centers [$F(2,117) = 7.8, p < 0.05$] as shown in Table 2.

Table 2: ANOVA Analysis of GMDQ Score for All Preschool Centers

Variance	df	Mean (Square)	F	P Value
Between Group	2	363.90	7.86	0.001*
Within Group	117	46.28		

* $P < 0.01$

Post Hoc comparison showed significant different between all preschool centers (Table 3). Post Hoc finding also showed a significant difference between GMDQ score for the government and private preschool ($p < 0.001$). The scores between government and KEMAS preschool also showed significant differences at $p = 0.018$. However, when comparing private and KEMAS preschool centers there was no significant difference ($p > 0.05$).

Table 3: The Differences of Post Hoc Test Score between the 3 Preschool Centers

Comparing Preschool	Differences mean	P Nilai
Government	Private	0.001*
	KEMAS	0.018**
Private	KEMAS	0.525

* $p < 0.01$, ** $p < 0.05$

Locomotors and Object Control Age Equivalent Level

Descriptive analysis of mean and standard deviation scores are shown in Table 4. Private preschool showed the highest AEL score of 5.72 (SD=0.608). KEMAS preschool had a mean of 5.49 (SD=0.515) and a mean of 5.40 (SD=0.536) for government preschool. As for the equivalent score of object control skill, KEMAS preschool showed the highest mean value and standard deviation score of 5.17 (SD=0.854). Private preschool showed a mean value of 4.88 (SD=0.916) and government preschool had a mean value of 4.47 (SD = 0.651).

Table 4: Descriptive Statistical Age Equivalent Score of Locomotor and Object Control Skill Based on Each Preschool Center

Variables	Preschool	N	Mean	SD
AEL	Government	40	5.40	0.536
	Private	40	5.72	0.608
	KEMAS	40	5.49	0.515
AEM	Government	40	4.47	0.651
	Private	40	4.88	0.916
	KEMAS	40	5.17	0.854

Based on ANOVA analysis there was a significant difference ($p < 0.05$) for the age equivalent score (AEL) of the 3 preschools [$F(2, 117) = 3.41, p < 0.05$] as shown in Table 5.

Table 5: Summary of ANOVA Test Comparison for the Age Equivalent Score of Locomotors Skill of the Preschool Children

Source of Variances	df	Mean (Square)	F	P Value
Between Group	2	1.049	3.41	0.036
Within Group	117	0.308		

* $P < 0.05$

Meanwhile for AEM score, ANOVA analysis (Table 6) showed there was a significant difference ($p < 0.05$) within the age equivalent score of object control skill for three preschools [$F(2, 117) = 7.39, p < 0.05$].

Table 6: Summary of ANOVA Test Comparison for the Age Equivalent Score of Object Control

Source of Variance	df	Mean (Square)	F	p-Value
Between Preschool	2	4.915	7.39	0.001
Within Preschool	117	0.664		

* $P < 0.05$

Post Hoc test results (Table 7) showed there was a significant difference between AEL score of government and private preschools ($p < 0.05$). The data also showed no significant difference between government and KEMAS preschool ($p > 0.05$). As for AEM score, the data showed there was a significant difference between government preschool children with KEMAS preschool children ($p < 0.05$). There were no significant differences between government and private preschool as well as between private and KEMAS preschool ($p > 0.05$).

Table 7: The Different Post Hoc Test Analysis for AEL and AEM Scores

Type of Score	Preschool		Mean Differences	P-Values
AEL	Government	Private	-0.312	0.035**
		KEMAS	-0.083	0.784
	Private	KEMAS	-0.230	0.157
AEM	Government	Private	-0.410	0.067
		KEMAS	-0.697	0.001*
	Private	KEMAS	-0.287	0.259

* $p < 0.01$, ** $p < 0.05$

Discussion

This research has managed to measure the level of gross motor development of preschool children in three different preschool centers. The findings have successfully identified significant differences between the three different preschool centers. The preschool children involved were able to achieve the skills just like other typical children in the normal developmental age (Ulrich, 2000). Comparing the achievement of children from the three preschool centers, the gross motor skills of children in the government preschool center were the lowest compared to private and KEMAS preschool children. The result showed that children in government preschool centers were experiencing a delay in their motor skills at the age of 6 years old.

Overall the research has measured the motor skills development levels of preschool children from a different type of preschool centers. The research findings have identified significant differences of each preschool centers. Table 8 showed the delay in locomotors skill (minimum: 5 months, maximum: 8 months) and object control skill (minimum: 10 months, maximum: 19 months) achievement among the preschool children. Children from government preschool centers were among the children who had the most problem at every level of gross motor development. Children from the government preschool also were experiencing a delay in mastering the locomotors and object control skills.

Table 8: The Age Equivalent Level for Locomotors and Manipulative Skills

Preschool Types	AEL	Note	AEM	Note
Government	5.40 (64 months)	8 months delay	4.47 (53 months)	9 months delay
Private	5.72 (67 months)	5 months delay	4.88 (57 months)	15 months delay
KEMAS	5.49 (65 months)	7 months delay	5.17 (62 months)	10 months delay

Suggestions and Recommendation

Based on the research findings, it is suggested that further research and insight into the preschool children participation and developmental domain need to be carried out. It is recommended that the Ministry of Education incorporate, infuse and instil Ulrich gross motor development skill assessment into the syllabus of teacher's training program to identify the level of motor development among children. The information gathers from the assessment can help preschool centers to plan and develop physical activities that are more suitable and relevant to the children abilities levels.

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