

Impact Study on Physical Activity Scores on Age Equality Locomotor, Object Control and Motor Skills in Preschool Children

S. Kavitha, Borhannudin Abdullah* & Aminuddin Yusof

Department of Sport Studies, Faculty of Educational Studies, Universiti Putra Malaysia, 43400, UPM, Serdang, Selangor

ABSTRACT

This study aims to determine the effects of physical activity on age equality locomotor, age equivalents object control and gross motor skills. The Study was conducted in two phases. Phase 1 of the study was descriptive in nature, involving 120 preschool children (B = 60, G = 60) was six years old. As for Phase 2, subjects consisted of preschool children in a government school in Bandar Seremban preschool, aged six years old who were learning Physical and Aesthetic through the National Pre-School Curriculum Standard (KSPK). Size study sample consisted of 50 preschool children (B = 32, G = 18), and sampling method is convenience sampling. The instrument used in this study is a Test of Gross Motor Development-2 (TGMD-2) developed by Ulrich (2000). Data obtained through motor ability tests cover six locomotor tests and six object control tests. MANOVA analysis and MANCOVA were used to determine the effects of an intervention program to control the pre-test. Findings: Based on the Phase 1 the study found that the level of gross motor development of preschool children between three preschools are not equivalent to the age of locomotor and object control. A government preschool selected for Phase 2 because the findings of means for gross motor skills are low compared with the mean score for the gross motor skills for KEMAS and private group students. The findings of the analysis of Phase 2 of the pre-test and control treatment groups reported a significant difference in the mean gross motor skills [F (3,46) = 4.99; p <0.05]. Univariate F test analysis showed significant differences for variables AEL [F (1,48) = 11,835, p <0.05, eta squared = .198] for the control and treatment groups. The analysis of the dependent variable AEM and GMDQ showed no significant differences, AEM [F (1,48) = 2,259, eta squared = P.045; p <0.05] and GMDQ [F (1,48) = 2.035; p > 0.05, eta squared = .041]. The tests showed traces of physical activity significantly to the gross motor skills of preschool children. There are significant differences in the mean gross motor development [F (3,46) = 11,296; p <0.05, eta squared = .424] between the control and treatment groups. Univariate F test analysis showed a significant difference in post-test scores for the dependent variable AEL [F (1,48) = 21,324; p <0.05, eta squared = .308], AEM [(1,48) = 24.71; p <0.05, eta squared = .340], and GMDQ [F (1,48) = 20,215; p <0.05, eta squared = .296], and for the treatment and control groups. Discussion: The overall level of motor development of preschool children are at a low level. The results support the intervention program that uses the module physical activity can help improve gross motor skills of children treated group.

Keywords: Preschoolers, gross motor skills, locomotor skills, object control skills, TGMD Test-2

INTRODUCTION

Preschool education is a learning program for children aged four to six years within a period of one year or more before their first year of formal education. Education Act 1996 has provided a significant change for preschool education. Preschool has been incorporated into the National Education System. Starting in 2002, all preschool children either organized by the Ministry of Education or the private sector should follow the syllabus prepared by the Ministry of Education.

National Pre-School Curriculum Standard (DSS) is designed for children aged four to six years (Curriculum Development, 2010). The standard document set the parameters and content of teaching and learning for all

* Corresponding author: borhannudin@upm.edu.my
eISSN: 2462-2079 © Universiti Putra Malaysia Press

preschool age. KSPK aims to develop the potential of children in a holistic and integrated in physical, emotional, spiritual, intellectual and social development that is in line with the National Education Philosophy. Standard content and learning standards was based on knowledge, basic skills and learning value in the following six pillars: Communication; Spirituality, attitudes and values; Humanities; Science and technology; Personal Skills Development and Physical Development and Aesthetic (Curriculum Development, 2014). Guided by the objectives from Preschool Curriculum, children should be able to master the basic fine motor skills and gross motor skills during early childhood. This clearly shows that early exposure of fine motor skills and gross motor skills since children can help in improving motor development. Therefore, the development of gross motor skills that are age equivalent to the age of locomotor and object control skills must be built before they reach the age of 6 years old. The Physical Development and Aesthetic subject, was designed to establish motor skills among preschool children.

Physical activity and motor skills need to be taught among preschool children because this is the best time for their gross motor development (Ozmum & Gallahue, 2005) Playing is the best learning experience for physical and mental development, which is a priority in early childhood education (Kambas, 2010). The situation has not improved significantly in today's society because children are less involved with physical activity and have little chance to develop motor skills. This is due to their lack of knowledge about the importance of physical activities and technological advances such as the use of gadgets such as mobile phones, television, computer, PlayStation, X-Box and others. The study also showed that the gross motor skills of children in Malaysia did not follow the proper chronological age (Abdullah, Amri & Fazil, 2009). This study is very important because the study of gross motor skills have not been performed on pre-school children in Malaysia. This study will employ some physical activation as an intervention program to see the effects on the locomotor skills and scores of object control skills development of gross motor skills among preschool children. The development of locomotor scores and object control skills will be compared before and after intervention.

The finding from part studies showed that children in government preschool centers were experiencing a delay in their motor skills at the age of 6 years old (Abdullah, Abd. Aziz, & Yusof, 2016). They also showed that the traditional game managed to improve gross motor development based on chronological age (Abdullah, Amri, Kok, & Abu Samah, 2013). In fact, a study of children aged six to nine years between races, Malay, Chinese and Indians have also shown differences in their motor development (Geok, 2009). The findings also show there is a delay in the early stages of the development of the school. The National Pre-School Curriculum Standard (KSPK) will need to be streamlined as elements of gross motor skills in the syllabus are taught separately in which there is only one gross motor skills in one activity. Such as to demonstrate throwing objects onto the target, bouncing ball, jump and so on. Recurring activities will cause children to feel tired and the fun element to play will not arise. Therefore, physical activity intervention program introduced in some of the elements that have a combined gross motor skills are important in a game like hit, run and jump. Physical activity is an activity that is very interesting and easy to implement because the rules of the game are simple. Physical activities that were designed is easy to implement. However activities are not given attention in preschool KSPK in the development of physical and aesthetic component of preschool children.

This study is focused on locomotor, control objects and gross motor skills of preschool children in which the study of gross motor skills has never been done in Malaysia. In addition, this study will help panel makers National Preschool Curriculum Standards to review the curriculum and physical activity in the domain of aesthetics preschool gross motor skills activities. In addition, basic data and Age equivalent manipulative (AEM), Age equivalent locomotor (AEL) level of preschool children were obtained from the study can be used to build a long-term program of effective physical training to develop locomotor skills and object control that is equivalent to chronological age. Pre-school teachers must also be informed on how to measure gross motor skills so that they can evaluate the skill levels of their students. In fact, this research can also provide knowledge about the effects of physical activity on the equality of locomotor, control objects and gross motor skills of preschool children. It can also be used by other researchers for the purpose of improvement.

Objectives

Objectives of this study are as follows:

- i) Measure the locomotor skills by scores equality and scores of object control skills gross motor skills of preschool children by three preschools KEMAS, government and private.
- ii) Determine the age of locomotor skills scores equality, equality of scores and scores of object control skills gross motor skills among preschool children.

- iii) Determine the effects of physical activity on an equal score of locomotor skills, age equality, object control skills and gross motor skill scores among preschool children by controlling the pre-test scores.

Research Questions

- i) Which group experienced a delay in the age of equality score of locomotor skills, age equality object control skills and gross motor skill scores among preschool children in three preschool KEMAS, the Government and the private sector?
- ii) What age equality score locomotor skills, age equality score object control skills and gross motor skill scores among preschool children study group?
- iii) Are there differences in the effects of physical activity on an equal score of locomotor skills, age equality score object control skills and gross motor skills scores between the control and treatment by controlling the pre-test scores?

Pre-school teachers must also be informed on how to measure gross motor skills so that they can evaluate the skill level of their students. In fact, this research can also provide knowledge about the effects of physical activity on the equality of locomotor, control objects and gross motor skills of preschool children. It can also be used by other researchers for the purpose of improvement. Sofiya A. (2012) conducted a study of 10 pre-school, 34 classes and 315 children to assess the impact of training Short Bouts of Exercise for Preschoolers (STEP) in classes designed as gross motor games to run for six months with the scheduling of game time in the morning and afternoon in the last 30 minutes each session. The findings showed that STEP must be applied in preschool learning in the learning of Physical Education and Health to improve children's physical fitness. Avigdor Zaski (2012) conducted a study on children aged four, five and eight years old for ten months to determine whether preschoolers can enhance manipulative skills. Elements in the Test TGMD-2 were used on the children twice a week for up to 10 months. The findings showed that movement skills should be implemented in preschool learning program. Landfill (2010) has made a review of 57 articles in order to identify factors that influence motor development of pre-school children. Every article which were reviewed was selected based on keywords gross motor development. Only articles that involve preschool children aged two to six years, as well as articles published after 1975 are selected. The results showed this pedagogy strategy can provide an opportunity for the development of children's motor abilities. It is recommended that preschool provides programs use this strategy which is suitable for children of preschool age.

METHODOLOGY

Phase 1 of this study was to determine the gross motor development scores between the KEMAS preschool, government pre-school and private pre-school. The focus of this study is to obtain basic data and determine the groups of children who need to be intervention based on gross motor development scores and delay in the age of equality score locomotor skills, age equality scores and scores of object control skills gross motor skills of preschool children. Study for Phase 1 is ex post facto. This design is used because of the characteristics tested among preschool children occurs naturally and the researchers did not perform any manipulation on feature. The sample size consisted of 120 preschool children aged three to six years from the nursery with 40 children from KEMAS preschool, 40 children from Government preschool and 40 children from private preschool in Negeri Sembilan. The sampling procedure used in this study is layered sampling.

The research design for Phase 2 study is quasi experiment involving pre-test-post-test control group design. The aim of this study was to measure the effects of physical training on the study group. The study involved a treatment group and a control group. A module for physical activity have been created for the treatment group and the control group will use the module teaching Physical Education and Aesthetic. The subjects in the Phase 2 consists of 50 preschool children. Government preschoolers was selected for the findings mean for gross motor skills are low compared with the mean score for the gross motor skills and KEMAS private group. The convenience sampling method used in this study. The sample size consisted of 50 preschool children aged six years old and is divided into two groups of 25 children to the control group and 25 children in the treatment group in each class. A total of 32 boys and 18 girls were involved in Phase 2.

Measurement

The gross motor development test (Ulrich, 2000) is used to measure the development of respondents with the accountability test level, $r=.96$ to $.97$. The research was carried out with two main aspects of gross motor and locomotor skills (6 items) and object control skills test (6 items). The test is sensitive to the gross motor learning for children age three to ten years old. The age equivalent locomotor (AEL), age equivalent manipulative

(AEM) and gross motor development level score (GMDQ) is identified as the dependent variables, meanwhile, the physical activities are independent variables.

Procedure

The treatment and control group were given a pretest at the first week of involvement and a post test on the 12th week. Both groups were exposed to physical education learning based on module in 10 weeks with 20 sessions and every session would take 35 minutes to complete. Each of the sessions was divided into three phases such as, warming up (5 minutes), physical activities (25 minutes), and warming down (5 minutes). Both groups were facilitated by the same teacher in physical education on the same day but at a different time. The pre and post test for the gross motor development was held in sequence, starting with the locomotor and followed by the manipulative skills. Each of the test items consists of two trials offered to the respondents before they were allowed performing the test. The actions will closely be guided, evaluated and recorded by an instructor. Participants who failed the first trial will be assisting by using guided demonstration. The performance score will be evaluated based on the criteria that exist during the test. The participants' motor action will be filmed and analyzed. Score from 0 or 1 will be awarded to each of the actions or skills performed as stated criteria. The raw score will be accumulated and recorded in a form of standard variables score.

FINDINGS

Score for Equality Age Locomotor, Object Control and Gross Motor Skills

From the data obtained in Table 1, the descriptive mean preschool Government is at the low score in the equality of locomotor skills (M=5.40, SD=0.536), age equality object control skills (M=4.47,SD=0.651) and gross motor skills (M=82.23,SD=5.78) among the three preschools. The results of Phase I has shown that government pre-schooler is on a low level and this government preschool is selected to participate in an intervention program in the Phase 2 study.

TABLE 1

Descriptive Statistics for Age Equality Locomotor Score, the Score of the Control Object and Gross Motor Skills in Preschool

DV	Preschool	N	MEAN	SD
AEL 0.536 0.608 0.515	Government	40	5.40	
	Private	40	5.72	
	KEMAS	40	5.49	
AEM 0.916 0.854	Government	40	4.47	0.651
	Private	40	4.88	
	KEMAS	40	5.17	
GMDQ	Government	40	82.23	5.78
	Private	40	88.08	7.61
	KEMAS	40	85.43	6.89

Referring to Table 2 shows the overall mean for age equality locomotor skills, age equality object control skills and gross motor skills score before intervention for preschool children control and treatment group.

TABLE 2

Score Age AEL Equality, AEM and GMDQ before Intervention

DV	Group	N	MEAN	SD
AEL	TREATMENT	25	4.00	.70
	CONTROL	25	3.42	.46
AEM	TREATMENT	25	4.61	.79
	CONTROL	25	4.28	.74

GMDQ	TREATMENT	25	81.52	9.19
	CONTROL	25	78.28	6.67

MANOVA analysis of pre and post test

Referring to Table 3, the overall results of multivariate Wilks' Lambda indicates the effects of physical activity programs are significant to the gross motor skills of preschool children. Based on these results, there are significant differences in the mean gross motor development [F (3,46) = 11,296; p <0.05, eta squared = .424] between the control and treatment groups. Physical activity programme to clarify that there is a 42.4% variance in motor skills. Univariate F test showed a significant difference in post-test scores for the dependent variable GMDQ [F (1,48) = 20,215; p <0.05, eta squared = .296], AEL [F (1,48) = 21,324; p <0.05, eta squared = .308] and AEM [(1,48) = 24.71; p <0.05, eta squared = .340] for the treatment and control group.

TABLE 3
Analysis MANOVA Pre-test and Post for Gross Motor Skill

DV	Pre-test			Post Test	
		Eta squared	F	Eta Squared	
GMDQ	2.04	.041	20.22	.296	
AEL		11.84	21.32	.308	
AEM	2.26	.045	24.71	.340	
Multivariate F		4.99		11.296	
Eta Squared	.246			.424	

MANCOVAs for the development of gross motor by controlling the pre-test

Referring to Table 4, post-test analysis suggests that significant [F (3,4) 5 = 10.9966; p <0.05, eta squared = .423] there is gross motor development research subjects. 42.30% post-test to clarify that there is variance in the mean aggregate gross motor development of the subject. Post-test also showed significant differences for all three dependent variables, GMDQ (post) F (1,47) = 19,205; p <0.05, eta squared = .290], and AEM (post) F (1,47) = 22:54; p <0.05, eta squared = .324] and AEL (post) F (1,47) = 18,220; p <0.05, eta squared = .279].

TABLE 4
Analysis MANCOVA Pre-test and Post-test for Gross Motor Skills by Controlling the Pre-test. (GMDQ)

DV	Pre-test			Post Test (GMDQ)	
		Eta squared	F	Eta Squared	F
GMDQ	18.413	.290		19.205	.290
AEL		11.450	.203		18.220
AEM	15.896	.261		22.536	.324
Multivariate F	7.526			10.996	
Eta Squared	.344				.423

A comparative analysis of pairs (pairwise comparison) conducted to identify pairs of means showed significant differences in the mean GMDQ (post), AEL (post) and AEM (post) for the treatment and control groups. The treatment group overcome the control group in all dependent variables.

DISCUSSION / RECOMMENDATIONS

This study showed that preschoolers have delays in gross motor skills score. There is an existence of a delay in gross motor development in preschool where pre-school children do not grow according chronological age. The findings also show gross motor skills can be enhanced through effective physical activities. The results of Phase

1 study, found that physical and aesthetic education activities contribute a very low percentage of the gross motor skill level and does not reach the desired target. This may be caused by programs that are used do not include all the elements of gross motor. The failure of this may be due to training or programme that is not suitable. Basic movement and gross motor development is emphasized. The focus of education is more focused on the skills of reading, writing and arithmetic. Their focus is more on educational activities in the form of lessons. This resulted in gross motor skills activities which occur at the level of the minimum among preschool children. If this is not monitored levels of gross motor development will continue to be left behind. If the application of Physical Education and Aesthetics are not monitored and restructured, preschool children will be left behind in the development of gross motor skills (Sofianidis, Hatzitaki, Douka, & Grouios, 2009).

Education authorities need to be concerned about the interests of the development of gross motor according to the chronological age of preschool children. The education Department should emphasize the level of gross motor skills to teachers of physical education. With the development of gross motor according to the chronological age of the child can master all the basic motor skills. The formation of an effective programme will enable children to master the basic movements such as coordination and balance. Indirectly, this maturity will cause their interest in a game which they participate. In addition, well planned activities must also be in the form of a game that can attract children in sports. Teachers also have to design teaching and learning objectives appropriate to the children and their level of ability and mastery.

REFERENCES

- Abdullah, B., Abd.Aziz, W.A., & Yusof, A. (2016). Level of motor skill development of preschool students. *Journal of Physical Education and Sport*. 16 Supplement issue 2, Art 175, pp. 1095 – 1098.
- Abdullah, B, Amri, S., Yee, K.L., & Abu Samah, B. (2013). The Impact of Traditional Games on the Gross Motor Skill Development of an Early Childhood. *The social sciences* 8(6):590-595
- Abdullah, .A., Saidun, A., & Aris Fazil. (2009). *Perkembangan Motor Kasar dan kesetaraan umur*. Dalam Seminar Pendidikan Jasmani, Februari 13-15, Kuala Lumpur, Malaysia.
- Avigdor Zaskl, L. (2012). Three year follow-up of an early childhood intervention: is movement skill sustained? *International Journal of Behavioral Nutrition and Physical Activity*, 9:127.
- Kambas, F.V. (2010). Environmental Factors Affecting Preschoolers' Motor Development. *Early Childhood Educ*, 37:319-327.
- Kementerian Pendidikan Malaysia. (2014). *Kurikulum Standard Pra Sekolah Kebangsaan*. Pusat Perkembangan Kurikulum.
- Pusat Perkembangan Kurikulum. (2010). *Pendidikan Fizikal dan Estetika: Huraian Sukatan Pelajaran Pra Sekolah* Kuala Lumpur: Kementerian Pelajaran Malaysia.
- Ozmum, J. C., & Gallahue, D. L. (2005). *Motor Development*. In J. P. Winnick (Eds), *Adapted physical education and sports* (pp.343-357). Champaign: Human Kinetics.
- Sofianidis, G., Hatzitaki, V., Douka, S., & Grouios, G. (2009). Effect of a 10 week traditional dance program on static and dynamic balance control in elderly adults. *Journal Aging Physiology* Act. 2009 Apr, 17(2): 167-80.
- Sofiya Alhassan. (2012). *Design and Baseline Characteristics of the Short Bouts of Exercise for Preschoolers*. (STEP) Study: BMC Public Health.
- Geok, S., K. (2009). *Kajian Sukan Di Malaysia*. Kuala Lumpur: Persatuan Penerbit Buku Malaysia.
- Ulrich, D., A. (2000). *Test of gross motor development: ExaMEANer's manual (2nd edition)*. Austin. TX: Pro-ed