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The Impact of Traditional Games on the Gross Motor Skill Development of an Early Childhood

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Abstract: The development of gross motor skills is fundamental to the advanced movement and specific skills. The development of such skill should be studied at an early childhood because development of gross motor skills which is in line with chronological age allows children to master their locomotor and manipulative skills. This study aimed to determine, the effects of traditional games on the level of gross motor development of early childhood. This study adopts two different modules, namely the traditional games module and the regular physical education module. The research questions were tested by two-phases of study: A descriptive analysis to determine the level of gross motor development and equality of age and MANOVA and MANCOVA analysis to determine the effects of interventions to control the other factors. Gross motor development data were obtained from locomotor and manipulative skills video recordings by using the Test of Gross Motor Development (TGMD) instrument. The overall level of gross motor development research subjects are below the average of 50% based on the percentile score of the GMDQ; year 3 (7.42%), year 2 (11.77%) and year 1 (20.56%). The findings also indicate the subject of year 3 very significant problems in three variables, namely; SLS, SMS and GMDQ. This group also experienced a significant delay in the AEL (2.93 years) and AEM (3.42 years) score. MANOVA analysis showed no significant difference in the GMDQ mean for pre-test [F (4.59) = 2:51, $p>0.05$, $R^2 = 0.146$] between the control and treatment groups. However, there are significant differences in the GMDQ mean for post-test [F (4.59) = 29.81, $p<0.01$, $R^2 = 0.669$]. Univariate F analysis showed a significant difference for the five dependent variables during the post-test; GMDQ [F (1.62) = 116.16; $p<0.001$, $R^2 = 0.65$), SLS [F (1.62) = 63.38; $p<0.001$, $R^2 = 0.51$), AEL [F (1.62) = 36.53; $p<0.001$, $R^2 = 0.37$) SMS [F (1.62) = 86.23; $p<0.001$, $R^2 = 0.58$) and AEM [F (1.62) = 48.76; $p<0.001$, $R^2 = 0.44$). Comparative analysis of the pair showed that the mean of the treatment group is significantly more than the mean of the control group in the GMDQ score (mean difference = 23.25; $p<0.001$), SLS (mean difference = 3.63; $p<0.001$), AEL (mean difference = 2.25; $p<0.001$), SMS (mean difference = 4.13; $p<0.001$) and AEM (mean difference = 2.01; $p<0.001$). MANCOVA analysis showed that there are significant effects of the traditional games for the GMDQ mean [F (4.53) = 26.13; $p<0.001$, $R^2 = 0.664$] after controlling the pre-test score, gender and income factors. In conclusion, the analysis supports the traditional games intervention programs to help improve the level of gross motor development of the treatment group after other factors are being controlled.

Key words: Gross motor development, traditional game, early childhood, children, locomotor

INTRODUCTION

The ability to use and manipulate gross motor skills is greatly related to the main muscles activities consists of the joints on performing basic movements (William, 1983). The gross motor skills movements of main muscles is a reflection of a synchronize series of activities by the temporal and spatial coordination in a simultaneous action. It is also a crucial skill in body movements from one place to another, as well as manipulating tools and as a basic platform towards advance movements in specific sports skills (Gabbard, 2000; Haywood and Getchell, 2001; Payne and Isaacs, 2002).

The development of such skills in early childhood may indicate for the well balance cognitive growths in children (Thomaidis *et al*., 2000; Payne and Rink, 1997), as they spend plenty of time interacting with their surroundings through physical activities in games and movements, such as crawling, rolling, walking, jumping and exctra. The development period of this stage is critical, as the biological system is too sensitive with the changes. The development of gross motor skills which is in line with chronological age until the age of 6 years old may indicates that they have passed the critical period successfully, whereas the result of failing to achieve this

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period of motor domain may contribute to tremendous impact to the children a long way from their childhood stage till adolescent (Gallahue, 1996; Poest *et al*., 1990). The problem may be encountered or improved through practical physical activities (Ericsson, 2008).

The development of gross motor skills in children may be observed through their participation in physical activities, such as implementing their locomotor and manipulative works. The ability to acquire the skills is a reflection of their gross motor skills level of achievements. Using traditional games this study aimed to determine the improvements of gross motor skills development within the selected respondents. The traditional games chose, such as Ketinting, Pukul Berapa Dato, Harimau, Galah Panjang, Roundas, Susus Tin, Kuda Kepang, Bola Sekerap, Mini Bola Keranjang, Main Monyet and Pepsi Cola.

Since now, study about contribution of Malaysian traditional games towards gross motor skills development in children have never been proposed. Most of the researches involving traditional games only focus on the adaptation element on the influence or effect of Greek traditional dance towards pre school children motor proficiency (Venetsanou and Kambas, 2004), the impact of traditional games towards the development of 7-9 years old children (Akbari *et al*., 2009) and the impact of 10 weeks traditional dance program towards dynamic balance control of children and adolescences (Sofianidis *et al*., 2009).

Hence, the early stage school children should be tested their level of gross motor development through traditional games. The objective of the research is to determine the effect of traditional games towards the gross motor skills improvement level among children at the age of 9.

Research objectives: This study was based on the following objectives:

- To measure the development level of early schooling children gross motor
- To determine the equivalents age of locomotor and manipulative skills
- To identify the effects of traditional game towards the development level of gross motor
- To identify other factors that would effects on the development level of gross motor

MATERIALS AND METHODS

Participant: The respondents, consist of 64 main stream children of year 3 classes (B = 33, G = 31) from a secondary school that following the Physical Education Syllabus of National Curriculum. The children were divided into two groups which are known as control and treatment group. The treatment group (n = 32) will aligned in physical activities (traditional games) for 10 weeks, whereas the control group (n = 32) will leave to the regular physical educations activities in school. Both of the groups are taught by the same teacher using different approach. All of them will sit for the pre and post-test before and after the learning session.

Measurement: Therefore, the gross motor development test is used to measure the development of respondents with the accountability test level, r = 0.96-0.97 within high contains validity (Anastasi and Urbina, 1997; Cools *et al*., 2008). The research carried out with two main aspects of gross motor and locomotor skills (6 items) and manipulative skills test (6 items). The test is sensitive to the gross motor learning for children age 3-10 years old.

This research involved quasi-experimental study consists of pre-post intervention design among the control and treatment group. The research carried out is to measure the impact of traditional games towards the gross motor skills development consists of locomotor and manipulative skills within the early stage school children. The GMDQ, SLS, SMS, AEL and AEM score is appointed as a dependent variables, meanwhile the traditional games is an independent variables. Factors such as age, BMI, sex, physical activity periods of time and economic status is used as a covariate for the research.

Treatment group: Treatment group consists of 32 children of year 3 classes (B = 16, G = 16; age 8.28 years old). They will be involved in 20 sessions of physical educations using traditional games approach. The traditional games selected are Ketinting, Pukul Berapa Dato' Harimau, Galah panjang, Roundas, Susun Tin, Kuda Kepang, Bola Sekerap, Mini Bola Keranjang, Main Monyet and Pepsi Cola. The games were modified to suite the children's level of physical ability, as well as the rules and regulations were standardized for the children to play and achieve the required objectives they need to acquire. The time table set must be strictly followed by the teacher in charge to enhance two games repeatedly played by two groups of children. Within 10 weeks of learning process each of participants will be experienced playing the games 4 times on each of the games appointed in the study.

Control group: Control group consists of 32 children of a year 3 class (B = 17, G = 15; age 8.55 years old) from the same school. They will be involved in 20 sessions main stream regular physical educations module focuses on gross motor skills learning in line with the physical

education syllabus of national curriculum. The control group will be taught on the same day as the treatment group but at different time.

Research instrument: Treatment group was tested using traditional games modules whereby, the control group used regular physical education module. Both of the modules have been evaluated and certified buy 4 key personals of physical education specialist coaches from Malaysia Ministry of Education.

The pre and post-test of the gross motor development used (Cober and Franks, 1988) to discover the performance of 6 locomotor skills and 6 manipulative skills for the children age 3-10 raw score for each of the sub locomotor skills between 0-48 (4 points for running, galloping, horizontal jump and slide, 3 points for leaping and 5 points for hop. Raw score for each of the manipulative sub skills are 0-48 (4 points for stationary dribble, kicking, overhand throw and underhand roll. The 3 points for catching and 5 points for striking a stationary ball). Percentile ranks from both raw score of sub locomotor and manipulative skills will be analyzed. Each of the respondents will be given 15-25 min to complete both tests.

Procedure: The treatment and control group were given a pre-test for the 1st week of involvement and a post-test on the 12th week. Both groups were exposed to physical education learning based on selected module in 10 weeks with 20 sessions and every session would take 35 min to complete. Each of the sessions was divided into 3 phases, such as warming up (5 min), physical activities (25 min) and warming down (5 min). Both groups were facilitated by the same option 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 that 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.

Data analysis: The research data will be analyzed using descriptive and inference. The outcome of the research will be discussed in 2 main sections. Phase 1, using descriptive analysis to determine the gross motor development level and the problem encountered in the equality age score of locomotor and manipulative within the early stage of school children and phase 2, using MANOVA analysis to determine the effect of development gross motor between the control group and the treatment group after MANCOVA intervention and analysis, as well as to determine other factors that effected the development of experiment groups gross motor. These 2 sections of analysis will emphasize on the dependent variables scores namely, Standard Locomotor Score (SLS), Age Equal Locomotor Score (AEL), Standard Manipulative Score (SMS), Age Equal Manipulative Score (AEM) and Gross Motor Development Score (GMDQ).

RESULTS

Descriptive analysis of pre and post-test: Table 1 showed that generally the mean score of treatment group in dependent variables SLS (M = 3.78, SD = 0.94), AEL (M = 4.35, SD = 0.80), SMS (M = 3.59, SD = 1.74), AEM (M = 4.63, SD = 1.00) and GMDQ (M = 62.13, SD = 6.46) is higher compared to the control group mean score SLS (M = 3.56, SD = 1.01), AEL (M = 4.34, SD = 0.93) SMS (M = 2.69, SD = 1.62), AEM (M = 4.40, SD = 0.89) and GMDQ (M = 58.75, SD = 6.33) during the pre-test. The result obtained from the post-test reflected the same pattern of mean score acquired by the treatment group

Table 1: Descriptive analysis of pre-test and post-test score

	Pre-test (n = 32)				Post-test (n = 32)			
	Treatment		Controlled		Treatment	Controlled	Treatment	Controlled
DV	M	SD	M	SD	M	SD	M	SD
SLS	3.78	0.94	3.56	1.01	8.34	2.06	4.72	1.55
AEL	4.35	0.80	4.34	0.93	7.41	1.89	5.16	0.93
SMS	3.59	1.74	2.69	1.62	8.06	1.83	3.94	1.72
AEM	4.63	1.00	4.40	0.89	7.17	1.34	5.17	0.93
GMDQ	62.13	6.46	58.75	6.33	89.22	8.62	65.97	8.64

SLS = Standard Locomotor Score; AEL = Age Equivalent Locomotor; SMS = Standard Manipulative Score; AEM = Age Equivalent Manipulative; GMDQ = Gross Motor Development Quotient

SLS (M = 8.34, SD = 2.06) AEL (M = 7.41, SD = 1.89), SMS (M = 8.06, SD = 1.83), AEM (M = 7.17, SD = 1.34) and GMDQ (M = 89.22, SD = 8.62) ccompared to the control group SLS (M = 4.72, SD = 1.55), AEL (M = 5.16, SD = 0.93), SMS (M = 3.94, SD = 1.72), AEM (M = 5.17, SD = 0.93) and GMDQ (M = 65.97, SD = 8.64).

MANOVA pre-test analysis: Table 2, the result of multivariate Wilks' Lambada showed that the development of gross motor skills was insignificantly different during the pre-test. The result was reported that the inexistence of significant difference in gross motor skills development [F (4.59) = 2.51; p>0.05] between the treatment and control groups.

Pairwise comparison was held to identify the min which indicates the significant difference within GMDQ and SMS for both treatment and control groups. By referring to the value of mean for both groups, result significantly showed, the treatment group was able to overcome the control group in two dependent variables which is GMDQ (min score: Treatment = 62.13, control = 58.75) and SMS (min score: Treatment = 3.59, control = 2.69).

Pairwise comparison, showed that the treatment group mean significantly overcome in score GMDQ (min difference = 3.38; p<0.05) and SMS (min difference = 0.91; p<0.05).

MANOVA post-test analysis: Table 2, concluded that multivariate Wilks' Lambada results indicate the impact of significant traditional games towards subject gross motor development is vital. Based on the report, there was a significant difference between the gross motor development mean [F (4.59) = 29.82; p<0.001, Eta^2 = 0.669] within treatments and control groups. Thus, traditional games clearly explained that 66.9% of variant stated in the combination of subject gross motor development.

Univariate F analysis showed there was a significant difference in post-test score for the dependent variables GMDQ [F (1.62) = 116.16; p<0.001, Eta^2 = 0.65), SPL [F (1.62) = 63.38; p<0.001, Eta^2 = 0.51), AEL [F (1.62) = 36.53; p<0.001, Eta^2 = 0.37), SPM [F (1.62) = 86.23; p<0.001, Eta^2 = 0.58) and AEM [F (1.62) = 48.76; p<0.001, Eta^2 = 0.44) for the treatments and control groups.

Pairwise comparison was held to identify the mean which indicate the significant difference within GMDQ, SLS. AEL, SMS and AEM for both treatment and control groups. By referring to the value of mean for both groups, significant result showed that the treatment group was able to overcome the control group in all dependent variables which is GMDQ (skor min: Treatment = 89.22, controlled = 65.97), SLS (mean score: Treatment = 8.34, controlled = 4.72), AEL (mean score: Treatment = 7.41, controlled = 5.16), SMS (mean score: Treatment = 8.06, controlled = 3.94) and AEM (mean score: Treatment = 7.18, controlled = 5.17).

Table 2: Pre and post-test score MANOVA analysis for gross motor development by group

	Pre-test		Post-test
Variables	F	Eta^2	F
GMDQ	4.46*	0.07	116.16***
SLS	0.80	0.01	63.38***
AEL	0.00	0.00	36.53***
SMS	4.67*	0.07	86.23***
AEM	0.93	0.02	48.76***
Multivariate F	2.51	-	29.82***
Eta^2	0.146	-	0.6690

*,***p<0.05, <0.001; Group (n = 64)

Pairwise comparison showed that the treatment group mean significantly overcome in score GMDQ (mean difference = 23.25; p<0.001), SLS (mean difference = 3.63; p<0.001), AEL (mean difference = 2.25; p<0.001), SMS (mean difference = 4.13; p<0.001) and AEM (mean difference = 2.01; p<0.001).

MANCOVA analysis: Table 3, the result of multivariate Wilks' Lambada showed the significant impact of traditional games toward the subject gross motor skills development in respect with other factors, such as the pre-test (GMDQ-pre), gender and income. The result also reported that there was a significant existence in gross motor development [F (4.53) = 26.13; p<0.001, Eta^2 = 0.664] between the treatment and control groups, although other factors are being controlled. The traditional games clearly explained that 66.4% of variant which concluded in the combination of mean in subjects' gross motor development.

Pairwise comparison analysis showed mean of treatment group significantly higher than the control group in GMDQ score (post) (mean difference = 21.91; p<0.001), SLS (post) (mean difference = 3.56; p<0.001), AEL (post) (mean difference = 2.39; p<0.001), SMS (post) (mean difference = 3.75; p<0.001) and AEM (post) (mean difference = 1.99; p<0.001). The results showed by controlling other factors such as, GMDQ-pre, gender and income, traditional games may lead to significant effect on gross motor development score within the subjects. The treatment group that exposed to the traditional game excises were able to perform better than the control group of regular physical education class in gross motor development skills based on the dependent variables GMDQ, SLS, AEL, SMS and AEM.

Table 3: MANCOVA analysis on gross moto development by group with controlled variable; pre-GMDQ score, gender and income

	Group		Pre-GMDQ		Gender		Income	
DV	F	R^2	F	R^2	F	R^2	F	R^2
GMDQ (post)	101.9300**	0.65	7.8600**	0.12	4.050*	0.07	4.160*	0.07
SLS (post)	57.7000***	0.51	0.4600	0.01	15.110***	0.21	0.010	0.00
AEL (post)	39.4200***	0.41	0.2400	0.00	14.630***	0.21	0.120	0.00
SMS (post)	83.3600***	0.60	17.4000***	0.24	0.780	0.01	12.290**	0.18
AEM (post)	53.7300***	0.49	5.7600*	0.09	0.170	0.00	17.570***	0.24
Multivation F	26.1300***	-	9.1500***	-	6.340***	-	4.800**	-
Eta^2	0.6640	-	0.4080	-	0.324	-	0.266	-

*, **, ***p<0.05, <0.01, <0.001; n = 64

DISCUSSION

Traditional games program are more effective compared to regular physical education module in developing gross motor skills level among respondents. The study showed that effective movement activities may contribute a great effect towards children gross motor development. This finding is in line with the ideas about significant influence of strategic program concerning the quality of children physical/live (Gabbard, 1988; Goodway and Branta, 2003).

The findings also significantly showed the treatment group was able to overcome the control group in all dependent variables such as GMDQ, SLS, AEL, SMS and AEM. By referring to Table 4, the treatment group experienced a drastic improvement in SLS mean (120.6%), AEL (70.3%), SMS (124.5%), AEM (54.9%) and GMDQ (42.9%) compared to the control group lower improvement after intervention program in SLS (32.6%), AEL (18.9%), SMS (46.5%), AEM (17.5%) and GMDQ (12.3%). This situation is in line with the finding of Akbari *et al.* (2009) which established the development of basic gross motor skills in intervention program. This research also found that there was a significant difference in development of equal locomotor and manipulative skills indicate by the increasing of score SLS and SMS (Table 4).

This study is in line with the research done by Goodway and Branta, found that the increasing of score in locomotor and manipulative skills of treatment group is better than the control group. They also found that the increasing of 80% in locomotor score of the treatment group compared to the control group which showed less improvement after the intervention which is 26%. The manipulative score showed an improvement of 80% for the treatment group compared to the control group which obtained only 24% (Rine *et al.*, 2004).

They have concluded that the gross motor development and the effectiveness of traditional games intervention program may positively relate to each other.

The contribution of traditional games was obvious in the equality of locomotor and manipulative subject research. The intervention program introduced was able to state a tremendous improvement in helping the subject to obtain higher equality age score up to 3.06 years in locomotor skills for the treatment group whereas the control group with the regular physical education syllabus only obtained 0.82 years in locomotor equality age score.

Table 4: Score improvement of dependent variables between controlled and treatment group after intervention

	Treatment			Controlled		
DV	Pre	Post	Imp. (%)	Pre	Post	Imp. (%)
SLS	3.78	8.34	120.6	3.56	4.72	32.6
AEL	4.35	7.41	70.3	4.34	5.16	18.9
SMS	3.59	8.06	124.5	2.69	3.94	46.5
AEM	4.63	7.17	54.9	4.40	5.17	17.5
GMDQ	62.13	89.22	42.9	58.75	65.97	12.3

Imp. = Improvement

In equality age score for manipulative, the treatment group showed an improvement of 2.54 years compared to the control group with 0.77 years of improvement. This findings is in line with other research such as Akbari *et al.* (2009) and Venetsanou and Kambas (2004) which stated that there was a tremendous improvement in development of gross motor among children after the intervention program. They also suggested that the development of gross motor among children with the strategic and effective program may fruits a great result. The results was consistent with the study done by Connor-Kuntz and Dummer (1996) which suggested a significant findings towards the development of gross motor through the accurate, effective and strategic motor skills intervention which is in line with the findings by Hamilton *et al.* (1999) and Derri *et al.* (2001) in development of locomotor and manipulative.

CONCLUSION

The intervention program using traditional games approach, may lead to a significant effect of traditional games towards the development of gross motor among the subject in all dependent variables SLS, SMS, AEL, AEM and GMDQ. The same results still remained or obtained after controlling the pre-test score. Analysis showed that only 3 other factors may contribute towards

the development of subjects' gross motor which is pre-test score, sex and income. Nevertheless, traditional games may contribute a great and significant effect towards the development of subjects' gross motor after controlling the pre-test score, sex and income. Analysis results clearly support with significant evidence that the traditional games may lead to a great effect in improving the development of gross motor skills level of the treatment group in this study.

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