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ETHNIC DIFFERENCES IN GROSS MOTOR DEVELOPMENT AMONG CHILDREN

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ABSTRACT

The purpose of this study was to assess the level of gross motor development among children based on ethnic differences. A total of 49 subjects aged between 8 to 9 years old were volunteered involve in this study (age, 8.55 ± .50 years old). There are two Malaysian ethnic involved in this study namely Malay (n = 28) and Indian (n = 21). All of the subjects are among students in one of the primary schools in Petaling Jaya, Malaysia. The subjects' level of gross motor development was assessed using the Test of Gross Motor Development version 2 (TGMD-2). The instrument was used to examine two important aspects of gross motor that are locomotor and object manipulation. The locomotor component skills consist of running, galloping, hopping, leaping, jumping and sliding. While the object manipulation component consists of striking, dribbling, catching, kicking, throwing and rolling. The findings showed that there were no differences observed on level of gross motor development between Malay and Indian in locomotor [t (46) = .524, p (.60)> .05] and object manipulation [t (44.09) = -1.45, p (.19)> .05]. The Gross Motor Quotient (GMQ) score showed by Malay (min = 87.46) and Indian (min = 81.00) are below average of level of gross motor development. In conclusion, the gross motor performance among children is lower compared to their actual age. While ethnic factors are not strong indicator to determine children's gross motor development in Malaysia.

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Introduction

The physical ability and performance in movement is very important in everyday life. It is because the fundamental of movement, especially among children encourages their participation in sports and physical activity (Pang & Fong, 2009; Bryant et al., 2016). In addition, movement or motor skills will not only give a positive impact on personality and self confidence (Bremer & Cairney, 2016; Veldman et al., 2015) but also ensure consistent involvement in sports (Baghurst & Mwavita, 2014). Children who are detected has a lower level of motor performance most likely are not able to participate actively in sport programs due to motor difficulties. Since childhood, the level of motor development and performance have to be taken into consideration and need to be evaluated regularly. Payne & Isaacs (2017) defined motor development as a changes in behavior and movement of human life. Meanwhile, Veldman et al. (2015) stated that motor development is a study related to changes in motor performance of human lifetime based on interactions with the environment. Hence, motor development encompasses changes in behavioral movements that occur throughout human life; from birth to death. It is imperative to monitor children's motor performance to understand their motor development according to their actual age. There are two types of human motor development namely gross and fine motor.

The development of motor performance started with the mastery of gross motor skills such as running and jumping then followed by fine motor skills such as painting and writing (Payne & Isaacs, 2017). Fine motor skills involve the use of fine or smaller muscles of fingers and hand in doing a more specific movement (Dehghan et al., 2017). It involves coordination of small muscles movements and sensory organs such as finger or hand movements and eye coordination. Hand-eye coordination is one of the basic development skills of children where vision is used to control the movement and actions. This skill includes painting, writing, coloring and many more. Meanwhile, gross motor skills involve the use of larger muscles to produce strength and power in the body, arms and legs (Ulrich, 2000; Hashim & Baharom, 2014). These gross motor skills encompass basic activities such as running, jumping, climbing and so on. According to Payne and Isaacs (2017), the skills of gross motor are optimally developed at the age of seven but it is dependent on the amount of experience in training and learning acquired during childhood (Santos et al., 2016). In addition, the development of a child's motor skill is also influenced by age, gender, ethnicity, location of residency and economic status (Adeyemi-Walker et al., 2018; Mahinderjit-Singh & Koh, 2018).

As stated, one of the factors that could affect motor performance among children is ethnicity. It is reported that factor of ethnicity may influence motor performance not only among children but also the entire society. In the study conducted by Luz et al. (2019) portuguese children presented beter performances in locomotor compared to U.S. children. While the study of children in England reported that black and white-born children showed better locomotive skills in comparison to Asian children (Adeyemi-Walker et al., 2018). Thus, it can be argued that ethincity is an important factor that should be studied in detailed in order to gain information regarding children's level of motor development especially in Malaysia. Although studies on ethincity in influencing motor skills development has been carried out abroad, however it is still underdeveloped in Asia especially in Malaysia. The study regarding the relationship between motor development and ethnicity needs to be done because Malaysia is a country with diversed ethnicity. According to statistical figures released by the Jabatan Perangkaan Malaysia (2018), the number of ethnic Malays is 69.1% followed by ethnic Chinese (23%), ethnic Indian (6.9%) and other ethnic groups (1%). Differences in ethnicity are based on cultural characteristics such as customs, family background, clothing, physical views, political orientation and economic activities (Zainal et al., 2010).

Each ethnic in Malaysian has significant differences especially in beliefs, culture and way of life. All these differences are factors that can classify an ethnic thus, may affect the development of an individual motor skills. In this study, there are two ethnics that were focused and studied; Malays and Indian. For the Malays, study indicated that the children will play and practice any sports until *maghrib* (praying time) at around 7:00 pm. Meanwhile, Indian children will play until they become tired. They don't have specific time to stop. However, the nature of the children is that they are active in doing physical activity and play whether individually or in groups (Santos et al., 2016). On the other hand, there is a cultural practiced by the Malay community, called stepping on the grounds. A young child who is just learning how to walk is released to step on the ground as a symbol of continuing his life. From the perspective of motor development, this belief is considered as providing experience and learning in a different environment for the child and indirectly may increase the development of gross motor of children. However, this belief is only practiced by the Malay community and not by the Indian communities. Due to these significant difference in cultural practices, hence, the purpose of this study was to assess the gross motor development of children 8 to 9 years old between Malays and Indian ethnic.

Methodology

Sample

A total of 49 children aged between 8 to 9 years old were volunteered involve in this study (8.55±.50 years old). Table 1 showed that 26 of the subjects are men while 23 are females. There are two ethnic groups involved in the study namely Malay and Indian. A total of 28 of the subjects are Malay (15 males and 13 females) while 21 of them are Indian (11 men and 10 females). All subjects were students at one of the Primary School in Petaling Jaya, Selangor. The selection of Malay and Indian ethnic is based on Lian et al. (2016) suggestion where Malay and Indian was the most active ethnic in Malaysia compared to others ethnic.

Table 1: Demographic of subjects (N=49)

Demographic	Frequency (n)	%
Gender		
Male	26	53.1
Female	23	46.9
Age		
8-0 to 8-11	22	44.9
9-0 to 9-11	27	55.1
Ethnic		
Malay	28	57.8
Indian	21	42.9
Male		
Malay	15	30.6
Indian	11	22.5
Female		
Malay	13	26.5
Indian	10	20.4

Instrument

The Test of Gross Motor Development 2 (TGMD-2) by Ulrich (2000) is a research instrument being used in this study. The instrument has frequently used to observe and monitor the level of gross motor performance among children. Many researchers already adopted this instrument in their study (Zadeh & Alvar, 2014; Cano-Cappellacci et al., 2015; Abdullah et al., 2017; Aye et al., 2017). With the proven high score in validity and reliability (Cano-Cappellacci et al., 2015), TGMD-2 was used in this study in order to assess the level of gross motor performance among children between Malay and Indian.

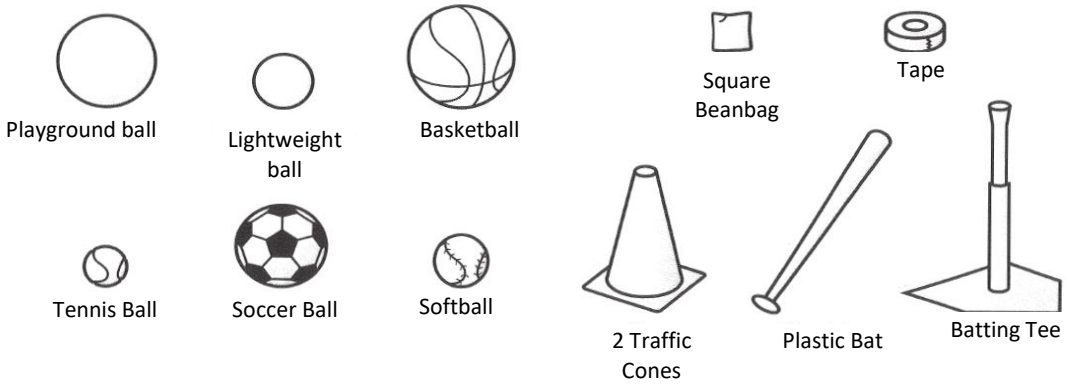

Fig. 1: Test equipment for TGMD-2

The instrument consists of 12 skills test that are grouped into two subtests namely Locomotor (without object) and Object Manipulation (object control skill). The locomotor measures gross motor skills that require fluid coordination movements of the body. The skills measured in locomotor subsets include running, galloping, hopping, leaping, horizontal jumping and sliding. While, the object control or manipulation measures gross motor skills that demonstrate efficiency in throwing, striking and catching movements (see Fig. 2). Six skills measured in object manipulation subsets are striking, dribbling, catching, kicking, throwing and rolling (Ulrich, 2000). The equipment needed for administering the test are shown in Fig. 1.

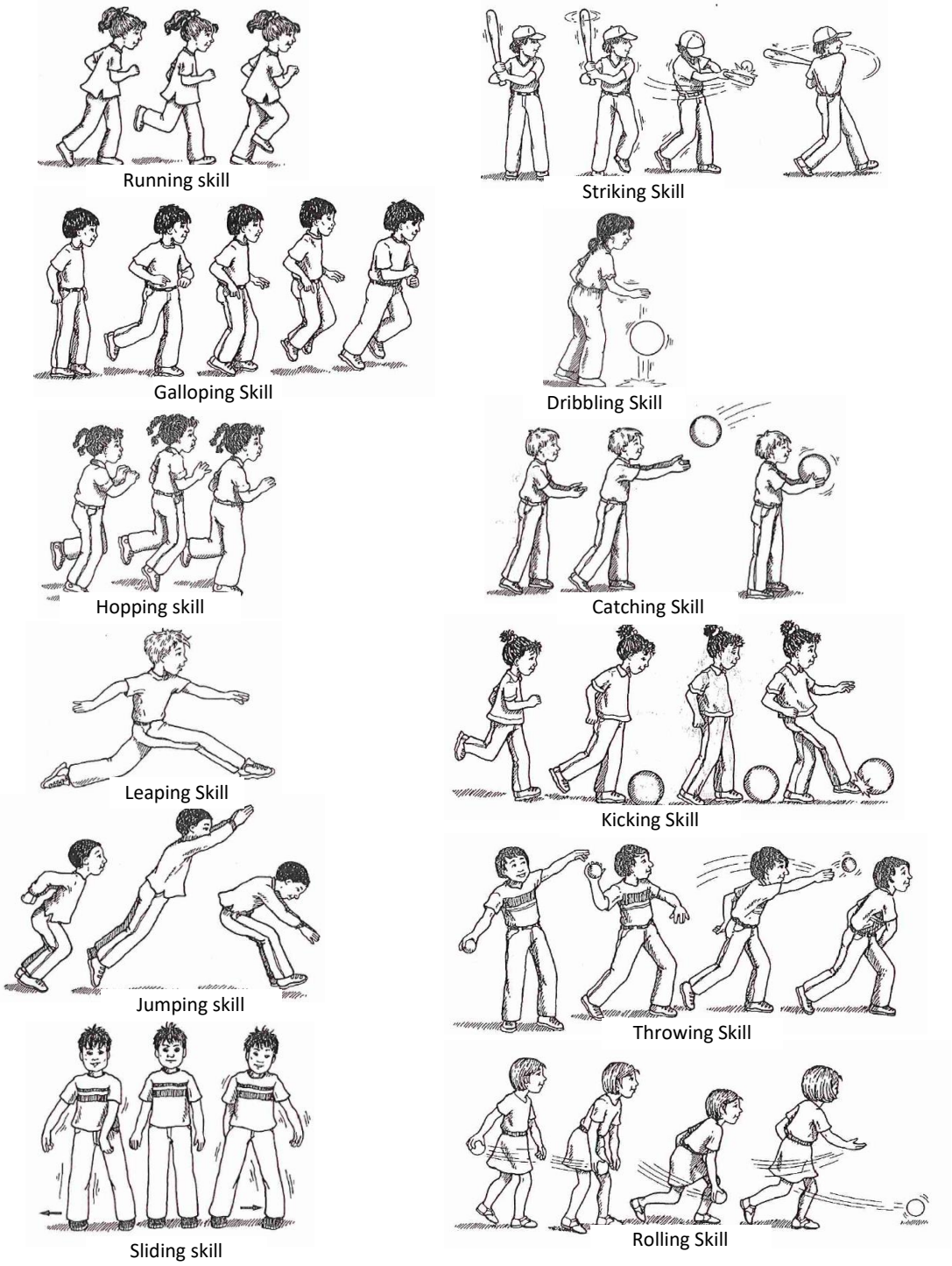

Fig. 2: Illustration guide for administering the TGMD-2

Procedure

Before the study was conducted, the letter of permission and consent form was sent to the school and parents regarding benefits and potential risks of the study. After consent was obtained, the teaching schedule for the class of Physical Education (PE) was identified in order to set the time of data collection. The test was conducted during PE class because the students were ready with their sportswear. Each of the test was carried out on a flat surface such as concrete to provide comfort and safety to the subjects.

Prior to the test, the demonstrators performed each of the skill tests in order to give first impression among subject. The subject then given some time to try the test for familiarization. The demonstrator must ensure that each of the subjects understands and performs the test with proper manner. If there is any

uncertainty showed by the subject, the demonstrator will re-perform the skill until the subjects can perform it well. The test begins when subjects agree and ready to perform the test. Subject were required to make two trails for each test. In total the subject did 24 trails for 12 skills tests. Every trail by the subjects was recorded using a video camera for scoring analysis purposes. Approximately, each subject was spent almost 20 minutes in order to complete all the tests. There are 4 demonstrators and 4 testers involved in this study and they all undergo the training of TGMD-2 almost three weeks of duration.

TGMD-2 Test Score

The video of the subject' skill test performance was then analyzed for the scoring purposes. The analysis of the video was conducted by two experts (Ph.D holder) in the field of motor development and performance analysis. These experts are knowledgable in TGMD-2 and have conducted and used the same instrument in their previous studies. Other than that, both of the expert taught motor development and biomechanic courses at degree level. For the inter-rater reliability, both experts has a responsibility to ensure score given by the tester is correct and similar. In addition, if there are unmatch rate score then expert will decide to give a new rating score based on their assessment of skill test.

Each of the tests consists with specific criteria and instruction for scoring evaluation. Every execution of test that meets the criteria, then one (1) mark will be given and zero (0) mark for every execution that not meet the creteria. The gross motor skill test consists of 3 to 5 criteria which is the basis of each assessment. The skill assessment for locomotor were based on standard score of 4 points that applied to running, galloping, jumping and sliding, 3 points for leaping and 5 points for hopping. While, the skill assessment of object manipulation were based on score of 4 points that applied for dribbling, kicking, throwing and rolling, 3 points for catching the ball and 5 points for striking. Two trails were given to each subject and they have the probability to score with a total of 0 to 48 points for both locomotor and object manipulation. Scores obtained are treated as indicator of the level of motor development among the subjects.

Table 2: Descriptive Rating for Subtest Standard Scores and Gross Motor Quotient

Subtest Standard Scores	Gross Motor Quotient	Descriptive Rating
17-20	>130	Very superior
15-16	121-130	Superior
13-14	111-120	Above average
8-12	90-110	Average
6-7	80-89	Below average
4-5	70-79	Poor
1-3	<70	Very poor

In order to make raw score more meaningful and consistent with the TGMD-2 scoring norms, the raw score should be adjusted based on percentile ranking, standard score, gross motor quotient (GMQ) and age equivalents. Percentile ranking is the percentage values that show the same distribution with or below each score. The standard score is the definite indicator of an subject' subtest performance. The score allow the examiners to make comparisons across subtest. For example, subjects who received the standard score of 16 on locomotor tests and 14 on object manipulation tests showed that the locomotor performance of subject was "superior" and object manipulation performance was "above average" (see Table 2). GMQ is the most reliable indicator of motor skills which is involving the total scored of two subtest. Meanwhile, age equivalent shows that each subject should performed according to the developmental age. Age equivalent also can estimate the gross score of subject.

Data Analysis

The data were analyzed using Statistical Package on Social Sciences (SPSS) version 25.0 with level of significance were set at $P \leq 0.05$. Descriptive analysis through mean and standard deviation was operated in order to assess the distribution of the subject's demographics. While, the inferences analysis was performed through Independent Sample t-test to analyze the hypothesis of the study that is there is no difference in the gross motor development among children between Malay and Indian ethnic.

Results and Discussion

Motor Skills Performance

Table 3 showed the motor performance score among Malay and Indian ethnic. Overall, the motor performance of both group of subjects was at the below average level based on the descriptive rating of standard score and GMQ (see Table 2). This result were proved by the mean of GMQ score by Malays and Indians ethnic with scores of 87.46 ± 1:01 and 81 ± 1.01 respectively.

Table 3: Motor development scores among Malay and Indian ethnic

Variable	Malay	Indian
GMQ	M = 87.46 SD = 1.01	M = 81.00 SD = 1.01

Locomotor and Object Manipulation Skills Test Performance

Based on the locomotor test (running, galloping, hopping, leaping, horizontal jumping and sliding) it was found that the subject of Malays and Indians recorded almost similar raw score that are 35.93 ± 4.97 and 35.19 ± 4.76 respectively (see Table 4). While, the object manipulation test (striking, dribbling, catching, kicking, throwing and rolling) showed that the Indian ethnic with a mean score of 33.29 ± 5.86 obtained a better raw score compared to the Malay ethnic with a mean score of 29.89 ± 1.04. The mean score of object manipulation and locomotor were also presented through graph bar in Fig. 3.

Table 4: Locomotor and Object Manipulation score of ethnics

Variables	Malay	Indian
Locomotor	M = 35.93 SD = 4.97	M = 35.19 SD = 4.76
Object Manipulation	M = 29.89 SD = 1.04	M = 33.29 SD = 5.86

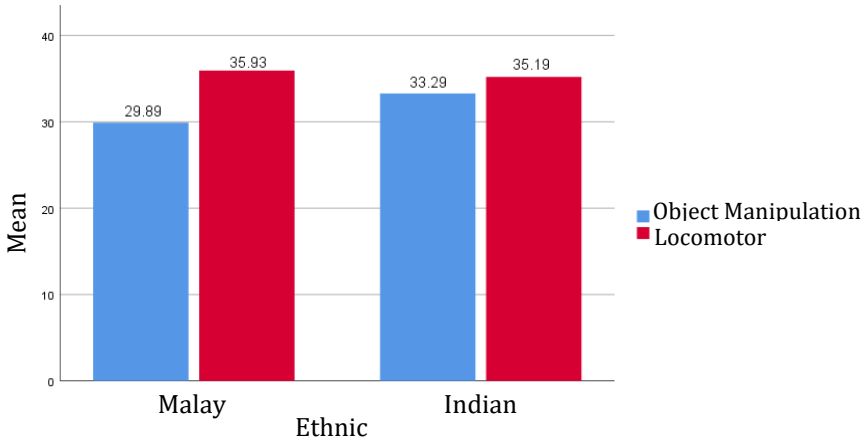

Fig.e 3: Locomotor and object manipulation mean score among Malay and Indian

Analysis of t-test

The inferential statistical test performed through Independent sample t-test. Table 4 displayed the results of locomotor and object manipulation skill of Malays and Indians ethnic. The t-test analysis showed that there was no significant difference in locomotor skills between the Malays and the Indian ethnic [t (46) = .524, p(.60)> .05]. While, the test of object manipulation skills also showed that both ethnics do not display any significant differences [t (44.09) = -1.45, p(.19)> .05]. Thus, the t-test analysis of locomotor and object manipulation skills showed that the Malay and the Indian ethnic are similar and do not show any significant differences.

Table 4: Analysis of Independent sample t-test on locomotor and object manipulation skills

	Ethnic	Mean	SD	*t*	*df*	*p*
Locomotor	Malay	35.93	4.97	.52	47	.60
	Indian	35.19	4.76			
Object Manipulation	Malay	29.89	1.04	-1.34	47	.19
	Indian	33.29	5.86			

Ethnicity is one of the factors that can be used as an indicator to determine the gross motor skills of children. It is due to the lifestyle, beliefs and culture of each ethnic groups which are varied (Adeyemi-Walker et al., 2018; Eyre et al., 2018; Kit et al., 2017; Venter et al., 2015). The purpose of this study was to assess the level of motor skills development among children 8 to 9 years between Malay and Indian ethnic. The hypothesis of this study stated that there is no significant difference in gross motor development of children between both ethnic. Based on the results, it is found that the level of gross motor development of locomotor and object manipulation skills are similar between Malay and Indian ethnic. The results of this study are in line with the study conducted by (Mayson et al., 2009), in which they found that there was no significant difference in gross motor development between Asian and European children living in Canada. Similarly, the white, black and Hispanic ethnic studies conducted on US children found that there was no significant difference in gross motor performance especially for locomotive skills (Kit et al., 2017).

For some countries, ethnicity factor is very influential in gross motor development among children. In some study, the black and white children have better locomotor performance than Asian children (Eyre et al., 2018; Adeyemi-Walker et al., 2018). However, the findings of this study conducted in Malaysia showed that the ethnic factors do not affect the children's development of gross motor. This is due to the interaction with environment, the demographic background and anthropometry characteristics showed some similarity between ethnics (Kit et al., 2017). The study by Sivanantham & Suberamaniam, 2014) stated that Malaysian societies, especially the Malay and Indian ethnic groups have experienced social integration that leads to understanding of each ethnic way of lives and interaction in the same environment. From the physical point of view, the Malays and Indians live a life full of physical activity, in which historically the Malays were originally employed in the agricultural sector while the Indian ethnic worked in plantation sector (Shamsuddin et al., 2015). It is claimed that this may indirectly contribute to the development of gross motor level among them. The lives and interactions of the Malay and Indian ethnic today also occurred almost in similar environments. According to Payne and Isaacs (2017), the appropriateness and availability of environment with adequate space to play can contribute to positive social situations for children to be active in performing physical activity and sports (Adeyemi-Walker et al., 2018). This kind of environment further contributes to their motor and mental development (Venetsanou & Kambas, 2010; Pereira et al., 2016).

Apart from the similarities of motor development between ethnicity, this study also found that the overall motor development of the subjects was at below average. This finding is in line with the study conducted by Hashim and Baharom (2014) which stated that the locomotor and object manipulation of motor performance among children for nine-year-olds in Malaysia is low. While, study by Bardid et al. (2015) among children aged six to eight years old found that their motor performance score is also at low level. This results indicated that the actual age of the subject does not reflect the motor performance based on developmental age. This means that, the motor performance at the actual age is below the developmental age of motor performance level. The low level of motor performance among children is due to the lack of facilities, equipment and physical activity programs availability (Khong Chiu et al., 2016; Abdullah et al., 2017; Adeyemi-Walker et al., 2018). In addition, the class of Physical Education (PE) taught in primary schools do not lead to the overall element of physical activity that can enhance the locomotor and object manipulation skills among students (Bardid et al., 2015; Ariff & Ibrahim, 2017). School teachers also do not take proactive steps to attract students for active involvement in physical activity at school (Hashim & Baharom, 2014). There are also PE teachers who do not teach the whole element of motor skills, especially the fundamental skills of throwing, catching, hitting and kicking skills (Baghurst & Mwavita, 2014; Chan et al., 2016).

Other than that, the lack of social interaction in terms of sports and physical activity has also yielded the level of motor development to be inconsistent with actual age (Dehghan et al., 2017). Most of the children spend a lot of time by being engrossed in mobile games rather than playing with their friends outside of their home (Kardefelt-Winther, 2017). Some parents do not allow their children to play outside of home for security reasons (Mahinderjit-Singh & Koh, 2018). Whereas, Khong-Chiu et al. (2016) stated

that the major obstacles of Malaysian society for their lack of involvement in physical activity are lack of time and interest in performing physical activities, weather conditions, health problems and lack of sports facilities. There is a study also stated that the performance of motor skills is increasing in parallel with age and physical maturity (Zadeh & Alvar, 2014). However, the experiences of childhood in their physical activity involvement in or outside the school is more important in influencing motor skills development (Bardid et al., 2015). Children who are active in their physical activity will have a better level of motor performance and maturity compared to those who are not active (Bastik et al., 2012). For inactive children, they may suffer negative consequences such as obesity and heart problems (Bremer & Cairney, 2016).

Therefore, the level of motor development in children should be take into consideration not only among teachers but also parents, peers and media (Santos et al., 2016; Kit et al., 2017; Mahinderjit-Singh & Koh, 2018). Development of motor skills does not only have a positive impact on physical appearance but also on health and self-confidence (Baghurst & Mwavita, 2014; Bryant et al., 2016; Ariff & Ibrahim, 2017). High motor performance also gives children the opportunity to selected as an athlete during the early stage of their sports involvement (Bastik et al., 2012). Hence, the motor performance of actual age and developmental age should be parallel in order to improve their motor performance through training and assessment should be done from time to time.

Conclusion and Recommendation

In conclusion, there are three important findings of this study; 1) there is no difference in level of motor development between Malays and Indian, 2) the level of motor development is low (below average), 3) The motor performance of children aged between 8 to 9 years old is lower than their developmental age. The research hypotheses have failed to be rejected as there is no significant difference in level of motor development either locomotor or object manipulation skills between Malays and Indians ethnic. Despite the fact that children aged between 8 and 9 years old however, the developmental age of children is 5 years and 9 months for locomotor skill and 5 years and 3 months for object manipulation skill. Due to the gross motor performance of these children low then their actual age, several parties who are involved with the children need to play a vital role. Parents should encourage their child to play a sport and perform physical activities. Some of the measures that could be taken to encourage active physical activities among them is by registering their children into the existing sports academy, bringing their children to the playground and reducing the use of mobile phone. For school teachers, they need to create playing space for students by encouraging active involvement from each student and conducting school sports programs on a regular basis.

For upcoming study, a participation of each ethnic needs to be done. This is because Malaysia is a multiracial country such as Malay, Indian, Chinese, Iban, Kadazan, Dusun and others. Certainly the diversity of ethnic groups is able to provide a holistic picture of motor development level and indirectly can assess the sport and physical activity involvement of each ethnics in Malaysia. In addition, the instrument of TGMD-2 is able to evaluate the motor performance from the age of 3 to 10 years old. So, future studies also need to cover the overall ages of children according to TGMD-2 instrument.

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