

Assessing Gross Motor Skills Development Among Children with Visual Impairment

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Abstract— the purpose of this study was to assess the gross motor skills development among visually impaired children. Total of 15 visually-impaired children participated in this study (7 males and 8 females), divided into three disability groups that are B1, B2 and B3 with age range between 7 - 10 years old. They were assessed on locomotor and object control skills that include running, galloping, hopping, leaping, horizontal jumping, and sliding, striking, dribbling, kicking, catching, throwing and underhand roll. The subjects perform the Test of Gross Motor Development-2. One Sample T-Test was used to analyze the significant of the hypothesized showed that there was significant lower object control but not locomotor skill scores. ($t=19.007$, $p=.000<0.05$). The mean value for Locomotor Skills for running group B1 is $6.60\pm.894$, group B2 is 7.00 ± 1.732 and group B3 is 7.20 ± 1.095 while for gallop group B1 is 4.00 ± 2.121 , group B2 is 4.40 ± 2.074 and group B3 is 5.00 ± 2.828 . Mean value for Hop group B1 is 5.20 ± 3.899 , group B2 is 8.00 ± 2.000 and group B3 is 9.20 ± 1.789 while for Leap group B1 is 2.00 ± 1.581 , group B2 is 1.80 ± 1.789 and group B3 is 3.40 ± 1.517 . Mean value for Horizontal Jump group B1 is 5.20 ± 1.789 , group B2 is 6.80 ± 1.095 and group B3 is 7.20 ± 1.304 while for Slide group B1 is 5.00 ± 1.414 , group B2 is 6.40 ± 1.673 and group B3 is $7.60\pm.894$. The mean value for Object Control Skills was, Striking Stationary Ball group B1 is 2.40 ± 1.140 , group B2 is 4.20 ± 2.168 and group B3 is 5.00 ± 3.082 while for Stationary Dribble group B1 is 3.20 ± 1.095 , group B2 is 5.40 ± 2.966 and group B3 is 4.00 ± 2.739 . Mean value for Catch group B1 is $3.60\pm.894$, group B2 is 4.00 ± 1.414 and group B3 is 4.40 ± 1.517 while for Kick group B1 is 5.00 ± 2.000 , group B2 is 6.40 ± 2.191 and group B3 also 6.40 ± 1.673 . Mean value for Overhand Throw group B1 is 4.20 ± 2.490 , group B2 is 4.00 ± 1.414 and group B3 is 5.60 ± 1.673 while for Underhand Roll group B1 is $2.80\pm.447$, group B2 is $3.20\pm.837$ and group B3 is 6.00 ± 2.828 . The gross motor skill result of the subjects are at the satisfactory level and the subjects give a full cooperation.

Keywords-Gross motor skills development, locomotor skills, object control skills, visually-impaired children

I. INTRODUCTION

Children with visual impairment (those who are blind and have low vision) are at risk for poor motor skill performance [1]. They have a behavioral appears clumsy, especially in a new situation. They hold head in an awkward position to look at something or hold a book or other objects in a peculiar position to look at them. "Tunes Out" when information is on the chalkboard or in a book which the student cannot read. Constantly they ask a neighbor to tell him/her what is going on. They also show signs of fatigue or inattentiveness. They exhibit poor self concept and ego development.

Physical education is one of the key learning areas for pre-primary and primary education [2]. It is a unique subject in that it can provide students with opportunities to develop gross motor skills. Gross motor skills acquisition is regarded as both a basis for and an end product of sound instruction in physical education [3]. The proficiency of gross motor skills is a prerequisite for children to experience success and enjoyment in

organized and unorganized movement activities [4]. Therefore, information from accurate gross motor skills assessment could be profitably used by physical educators in designing appropriate instructional experiences for children.

The proficiency of gross motor skills becomes precursor for children to experience success and enjoyment in organized and unorganized movement activities [4]. Therefore, information from accurate gross motor skills assessment could be useful for physical educators/therapist in designing appropriate instructional experiences for children.

Gross motor skills were commonly used in play and sport [5]. They were considered as the building blocks to the acquisition of more advanced movement forms [6, 7, 8]. These skills enabled children to control their bodies, manipulate their environment and display complex skills and development patterns involved in sports and other recreation activities [9, 10, 11]. Research demonstrated that children who had better proficiency of gross motor skills found it easier to acquire sport skills than their counterparts who experienced deficits [14]. Gross motor skills was considered as a predecessor to more advanced movement skills and specific sport skills [15, 16, 17, 18] and were included in the national content standards in physical education in some countries.

The purpose of this study was to assess the development gross motor skill among visually-impaired children in a special school in Kuala Lumpur.

II. METHODOLOGY

A. Sample

There were 15 visually-impaired children participated in this study (7 boys and 8 girls). The age ranges for all participants were 7-10 years old. They been divided into three visually-impaired groups that are B1, B2 and B3.

B. Instrumentation

Test of Gross Motor Skills Development (TGMD-2) was used to assess the development of gross motor skills among the participants. This test was developed by [19] and it includes two subtests (locomotor skills and object control skills). Locomotor skills tests includes running, galloping, hopping, leaping, horizontal jumping, and sliding while object control skills includes striking, dribbling, kicking, catching, throwing and underhand roll. Specialized equipment that also used in this study were lightweight balls, tennis balls, cones,

plastic bat, batting tee, basketball, 4- inch plastic ball, tape, soccer ball, and a wall.

C. Data collection

To accommodate the testing, 12 gross motor skill test items were divided into two stations which were arranged in a fixed order. Station 1 included the following gross motor skill test items: Slide, Hop, Throw, Roll, and Catch, whereas the other 7 skill test items (Gallop, Jump, Dribble, Kick, Run, Leap, and Strike) were conducted in Station 2.

The testers were responsible to explain and demonstrate the gross motor skills to participants. The skill demonstration and verbal description were standardized according to the directions listed in the Test Manual of TGMD-2 [19].

After the demonstration, a practice trial was given for each participant. Then participants were asked to perform two test trials in turn. In order to assure participants to perform maximally, the participants will be accompanied by the normal person to guide them doing all the test and verbal encouragement to participants were made to make sure they will not out of control. Testers were instructed to use remarks such as “throw hard” or “jump far” to encourage participants. Big, bright, orange-colored cones were used instead of normal cones to indicate the beginning and end of a course for the locomotor skills and to indicate the child’s position for the object control skill. For the object control skills, bright yellow colored balls were used. Furthermore the children were allowed to feel the items, if appropriate, before the test was administered. When necessary, the tester let the child “feel” the required movement and gave additional instruction before the two test trials were administered. In order to develop a systematic observational strategy, several elements were considered. Regarding the focus of observation, testers were informed to observe the performance of participants based on critical features. Therefore, their focus of observation was to identify the presence or absence of behavioral components of the skill which were listed in the TGMD-2. The duration of test in each station lasted about 35 minutes.

D. Analysis of data

Descriptive statistics was use to describe the central tendency, variability and frequency of the score. Independent T-Test was used to analyze the score between boys and girls while Pearson correlation was done to investigate the relationship between locomotor

and object control skill development among the participants.

III. RESULTS

The data of all participants was obtained from the TGMD-2.

Table I.
The mean score for the B1 group on locomotor skills and object control skills

Variables	Number	Mean	Standard deviation
Run	5	6.60	0.89
Gallop	5	4.00	2.12
Hop	5	5.20	3.89
Leap	5	2.00	1.58
Horizontal jump	5	5.20	1.78
Slide	5	5.00	1.41
Striking stationary ball	5	2.40	1.14
Stationary dribble	5	3.20	1.09
Catch	5	3.60	0.89
Kick	5	5.00	2.00
Overhand throw	5	4.20	2.49
Underhand roll	5	2.80	0.44

The results shows that student with group B1 has obvious low object control skill than locomotor skill. For striking stationary ball, the mean score is 2.40±1.140. It shows that they have very limited movement because on their disability but different from run, the mean score is 6.60±0.894. This is because running is the normal movement of their activity of daily life so they would not have much difficulty in performing the locomotor skills. The B1 or totally blind group has low score because on the severe visual impairments and they do not have any experience to perform the activity. This is also prior of understanding instruction by the tester. For example, the mean score for hoping is 5.20±3.899. Its shows that group B1 did not perform well in this skill. Hopping was a more difficult locomotor skill since it required additional strength and better balance. Most children did not demonstrate mature hopping patterns.

Table II.
The mean score for the B2 group on locomotor skills and object control skills

Variables	Number	Mean	Standard deviation
Run	5	7.00	1.73
Gallop	5	4.80	1.16
Hop	5	8.00	2.00
Leap	5	1.80	1.78
Horizontal jump	5	6.80	1.09
Slide	5	6.40	1.67
Striking stationary ball	5	4.20	2.16
Stationary dribble	5	5.40	2.96
Catch	5	4.00	1.41
Kick	5	6.40	2.19
Overhand throw	5	4.00	1.41
Underhand roll	5	3.20	0.83

The results (Table II) shows that for Gallop activity (4.80±2.168), children cannot perform well because galloping was more advanced locomotor skills. Skillful execution of galloping required a slight forward lean and a thrusting forward of the lead leg. If we doesn't familiar with this activity it will cause difficulties and wrong in action. This same goes for the B2 group (visually-impaired with certain level of visual acuity).

Table III.
The mean score for the B3 group on locomotor skills and object control skills

Variables	Number	Mean	Standard deviation
Run	5	7.20	1.09
Gallop	5	5.00	2.82
Hop	5	9.20	1.78
Leap	5	3.40	1.51
Horizontal jump	5	7.20	1.30
Slide	5	7.60	0.89
Striking stationary ball	5	5.00	3.08
Stationary dribble	5	4.00	2.73
Catch	5	4.40	1.51
Kick	5	6.40	1.67
Overhand throw	5	5.60	1.67
Underhand roll	5	6.00	2.82

Table III shows the mean score for the B3 group on locomotor skills. For Run, the mean score is 7.20±1.095, for Gallop the mean score is 5.00±2.828, for Hop the mean score is 9.20±1.789, for leap the mean score is 3.40±1.517, for Horizontal Jump the mean score is 7.20±1.304 and for Slide mean value is 7.60±.894. The mean values for object control skills are; Striking Stationary Ball mean score is 5.00±3.082, the mean value for Stationary Dribble is 4.00±2.739, the mean score for Catch is 4.40±1.517, mean score for Kick is 6.40±1.673, mean score for Overhand Throw is 5.60±1.673 and mean score for Underhand Roll is 6.00±2.828.

The B3 group has the most vision of the classifications of visual impairment. It was not surprising that they have a good score of locomotor skills and object control skills than the other 2 groups. But, they still have weaknesses on the object control skills. For example, striking stationary Ball, which is they got an average score. We can predict that without have good eye coordination they can't perform well on striking stationary ball because it was a quite complex object control skill. Stationary dribble also has a low score. It is because this skill requires precise judgment of an object's distance, force and trajectory. To achieve a mature form of dribbling, a pushing action was used to propel the ball with the elbow nearly fully extended. Without good eye coordination is get them lost of ball control.

Table IV

T-test results on locomotor skills (LM) and object control skills (OC) for visually-impaired children

	Mean	SD	t	Sign.
Raw score LM	34.00	6.92	19.00	.000
Raw score OC	26.53	7.51	13.68	.000
Standard score LM	4.53	1.59	10.99	.000
Standard score OC	2.93	1.66	6.81	.000

*p <0.05

The table above shows the result for Locomotor and Object Control Skills among visually-impaired children. The T-test results showed that there is significant lower object control skills but not locomotor skill scores among children with visual impairment (t=19.00, p=.000<0.05). From the test result, there is significant difference of lower object control skills but not locomotor skill scores among visually-impaired children. They are not familiar with the object control skills. They also have difficulties in controlling the ball. Visually-impaired children often use locomotor skills in nonorganized play and sports activities, but for the object control skill good eye coordination is require getting a good result of the skills.

IV. DISCUSSIONS

The visual impaired children did not perform well on the object control skills. The small adaptations made in the TGMD-2 for them that may have elicited optimal performance and, if anything, reduced the magnitude of differences between the visual impaired children and the sighted children. Children with visual impairment often use locomotor skills in non-organized play and sports activities [20], which may explain the comparable performance of children with visual impairment and the sighted children. Visual impaired children are able to use and practice these skills in the common and familiar environments of the playground, gym, or home, which may have lead to ample movement experience in these skills. Successful performance of these skills in a relatively stable environment, then, seems less dependent on visual information. However, they are placed in novel or demanding environments (e.g., avoiding obstacles), performance of the locomotor skills will be more difficult. Therefore, it would be interesting to measure these skills in play activities via authentic assessment procedures [21].

According to [1], visual impaired children did not seem to differ in locomotor scores from sighted children. For the object control subtest, children with visual impairments scored significantly lower than sighted children. It shows that significant with this study

because on the lack of object control skills of visual impaired children.

With respect to the object control skills, the visual impaired children had lower scores than the locomotor skills. This was not surprising given that object control skills are less natural for them than for the sighted children [4]. These skills are more complex, and object control skills are generally used and practiced in situations with (fast) changing conditions in which visual information is the most important source for necessary information about the environment. However, some of them obtained high scores on the object control subtest. Thus, it seems these children were able to learn, to a certain standard, the required coordination pattern of most object control skills when environmental and task factors were relatively stable; they would be at a disadvantage compared to sighted children when using these skills, because object control skills are generally practiced and used in play and sport situations that require fast adaptation to changing environmental circumstances. Therefore, it seems possible that children with visual impairment have less movement experience with object control skills.

V. CONCLUSIONS

This study was conducted to identify the gross motor skills development among visually-impaired children in a special school in Kuala Lumpur. Children with visual impairment have poorer quality object control skills locomotor skills. In this investigation, the degree of the visual impairment was not associated with poor gross motor skills performance. Although vision is important for motor skills performance, it is certainly not the sole factor in determining the gross motor skill performance of visual impaired children. Indeed, continuous interaction exists between factors within the child, the environment, and the task. It been suggested that task factors primarily influence the coupling between (visual) information and movement hence, the performance of the children with visual impairment depends on the task characteristics with visual impairment.

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