Locomotor and Object Control Skills of Children with Intellectual Disability in Cairo

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Introduction

Disability is one of the serious problems faced by communities globally. There are about one billion people with disability worldwide, accounting for 15% of the world population (World Report on Disability, 2011). The number of people with disabilities in Egypt is estimated to be 474,949 including 106,336 people with intellectual disability. The most recent census figures (2006) report 10,512 in Cairo alone.

The American Association on Intellectual and Developmental Disabilities (AAIDD) definition of intellectual disability states that, "Intellectual disability is a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills. This disability originates before the age of 18."(Auxter et al, 2010, p. 363)

People with intellectual disability in Egypt receive care through two main governmental systems. The first is special education schools affiliated with the Ministry of Education. These schools focus on children with mild intellectual disability whose IQ scores range from 50 to 75 (Directorate General of Special Education, 2012). The second system is represented by the societies and organizations of the Ministry of Social Affairs for persons with IQ score less than (50). Both systems provide learning, education, and rehabilitation programs appropriate to the nature of disability and level of the individuals' abilities.

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The number of students with intellectual disability enrolled in the special education schools is estimated to be 19,758 country-wide and Cairo accounts for 2,580 students (Ministry of Education 2010/2011).

Motor development is one of the main aspects of child growth, since it affects the other aspects of growth in such a significant way. A motor skill is considered to be the direct manifestation of this aspect of growth. People with intellectual disability are generally characterized with a low level of physical fitness and motor skills; usually they are more susceptible to physical problems and illnesses in comparison with their non-disabled, same age peers. Eichstaedt and Lavay (1992) stated that persons with intellectual disability usually lack motor experience. Hence, they suffer from poor motor skills and experience failure in playing games and sports. They are often rejected, or not selected, by their peers in play situations. They then lag further behind peers in developing their motor skills and abilities leading to development of a more sedentary lifestyle and exacerbating their lack of motor skills. (Eichstaedt & Lavay, 1992; Patricia, 2010).

Due to the weakness of the motor aspect of children with intellectual disability, and the importance of developing these motor skills, for performance of the necessary movements of daily life, several studies have been conducted on development of this motor aspect via application of various programs and assessing the relevance of enhanced motor development to other aspects of growth. These studies reflect the positive role of physical education, with its different activities, in promoting the physical, motor and social abilities of these children, (Abd-El-Raouf 1998; Ahmed 2001; Alaa-El-Din 2006; Amira 2001; Berksan 1978; Jihan 2000; Salah 1992; Raniah 2002; Zakiya 2009).

Performance evaluation is posited as the first and major step, in developing the most appropriate programs for children with intellectual disability, and monitoring the progress of children's responses to these programs. Deficiency in performance

evaluation process may conduct many problems.

The most important reason for the present difficulties of special education programs for children with disability in the Arab world is that many people believe that these programs are ineffective and of no avail. Hence, justifying special education services from a human rights perspective only is not sufficient. The community has to be informed of the evidence proving that special education is useful and effective, and that it leads to enhancement of the behavior of children with disability and development of their skills and abilities. This necessarily requires evaluating the effectiveness of special education programs by scientific means (Gamal & Mona, 1994).

There are several objectives of motor skills evaluation, as Burton and Miller (1998) indicated that such an evaluation aims at the following: determining; categorizing; planning treatment or instructional strategies; assessing the course of change; giving feedback to the performer or to whomever party may be concerned; and/or producing forecasts. Adapted physical education standards also include understanding the importance of monitoring the quality of program operations (Kelly,2006). In spite of the importance of this process, there is a scarcity of tools for evaluating motor skills of children with intellectual disability in Egypt. According to (Raniah, 2005) during the period from 1970-2004, the scientific papers tackling the situation of individuals with intellectual disability in the two faculties of physical education at Helwan University (the oldest faculties of physical education in Egypt) only resulted in the introduction of two batteries; one for measuring motor perception and the other for measuring physical fitness.

The Test of Gross Motor Development (TGMD-2) was standardized for the Egyptian environment (Raniah & Zahraa, 2006). The test standardization resulted in adding the hop test and omitting the test of striking a stationary ball, as baseball is not played in Egypt.

The TGMD is regarded as one of the best tests for this purpose, whether in its 1985 or

2000 format. The TGMD-2 tests skills "typically developed during preschool and early elementary years" (TGMD-2 manual, p.2). In addition, this test is characterized with sound reliability and validity in all the different samples, as it went through numerous research stages, to reach such a degree of effectiveness (Ulrich , 1984, Ulrich & Wise, 1984; Ulrich et al., 1988;Ulrich et al., 1989). Many studies noted the effectiveness of using the test in adapted physical education (Auxter et al, 2010; Berkeley et al ,2001;Casey& Mary,2011;Evaggelinou et al, 2002; Horvat&Kalakain,1996; Kelly, L.,2006; Leitschuh& Dunn, 2001; Sherrill,1998; Suzanne et al,2010; Youngdeok et al,2012). Moreover, it is easily applied.

This test also includes the same skills listed in the physical education curriculum of special education schools for individuals with intellectual disability in Egypt. The test was used in its original form TGMD-2, to achieve the objectives of the current research. The purpose of this study was to evaluate locomotor and object control skills of children with intellectual disability in Cairo, and to compare their scores to the Test of Gross Motor Development (TGMD-2) (Ulrich, 2000) standardized norm scores.

Method

Participants

The participants were fifteen children (13 boys and 2 girls) with mild intellectual disability, ranging in age between 7 and 10 years old. They were students at one of governmental special education schools for Children with Intellectual Disability in Cairo. The number of students in this age group enrolled in the school was 25. The 15 students attended regularly and were participants of the current study.

The participants met the conditions of enrollment in these schools: having an IQ score that ranges from 50 to 75; being free from any other disabilities that prevent taking advantage of the educational program for these children; and having all the admitted students under observation for at least two weeks to make sure that they meet the psychological stability conditions. Students are enrolled in the school only

after performing psychological tests, medical examinations, and fulfilling the previous conditions. (Directorate General of Special Education, the technical directives and administrative instructions for the schools and classes of special education of the academic year 2011/2012, the Ministry of Education, the Central Administration for Elementary Education).

Instrument

This instrument included the elements comprising the Test of Gross Motor Development second edition (Ulrich, 2000) represented in two subtests; each one measures a different aspect of gross motor development. The first subtest included locomotor skills (run, gallop, hop, leap, horizontal jump, slide). The second included object control skills (striking a stationary ball, stationary dribble, catch, kick, overhand throw, underhand roll).

Each of the skills listed in the test has a number of performance criteria. The child performs and has two trials. If s(he) performs well, s (he) will receive (1) point and if s(he) does not perform, s(he) will receive (0) points for each criteria. The criteria points for each skill in the two trials are accumulated. Accordingly, each subtest has a raw score and the two tests scores were added to have a total score. This score was then converted to the Gross Motor Development Quotient (GMDQ), as the standard score of the subtests ranges between 1 and 20 and the standard score of GMDQ ranges from 46 to 160. There are descriptive ratings of the scores of the subtests and GMDQ such as *very superior, superior, above average, average, below average, poor, very poor*. For checking the reliability of this test, more than one method totaling or exceeding (0.87) were applied, as stated in TGMD-2 manual (Ulrich,2000).

Procedure

All the necessary administrative approvals were obtained for conducting the research, such as the approval of the Information Security Administration at the Central Agency for Public Mobilization and Statistics (CAPMAS), the approval of the educational directorate to which the school is affiliated, the approval of the school

management and the parents of participants.

Both researchers paid a visit to the school to determine the suitability of the facility, to administer the test and identify the number of the enrolled children in the age group, and prepare the tools necessary for application.

The test was administered at the school gymnasium to all the participants. All the guidelines and recommendations of applying the test were followed as stated in the test manual. The test takes approximately 15 to 20 minutes to administer. The two subtests were completed during 4 days; either the physical education teacher or the psychiatrist was permitted to stay. The researchers administered the test as they are trained in performance evaluation. To establish the inter - scorer reliability, each researcher evaluated 5 children from the same school with children aged 11-12 years; the correlation between the two results was 0.92 for object control , 0.98 for locomotor and GMDQ. The internal consistency established for 53.33% of the participants in the study by using the Alpha Cronbach coefficient; it turned out there is a strong correlation between the items of the Locomotor skills , the object control skills and the test as a whole.

Data Analysis

The raw scores of the locomotor and object control skills were converted to the standard scores submitted in TGMD-2 for each participant. The standard scores total of both subtests of each participant was used to determine GMDQ. The standard score z was used to calculate the effect size (ES) (Fouad, 1979), by using the scores of both subtests and GMDQ. T-tests were used to determine the significance of differences between the mean of converted standard scores of the original test sample and the sample of this study.

Results

Table 1 indicates the age, gender, raw scores and adapted standard scores of both subtests and GMDQ for the boys (n=13) and the girls (n=2) (See Table 1).

Table (1)

Subtest Standard scores, Gross Motor Development Quotient (GMDQ)

	Demographics		Locomotor Scores		Object Control Scores		Sum of Subtest Standard Scores	GMDQ
Participant	Gender	Age*	Raw	Standard	Raw	Standard		
1	M	7-8	20	2	27	4	6	58
2	M	7-5	2	1	19	2	3	49
3	M	7-4	4	1	9	1	2	46
4	M	9-0	22	1	35	5	6	58
5	M	10-10	26	2	20	1	3	49
6	M	9-3	27	3	26	1	4	52
7	M	10-10	17	1	22	1	2	46
8	M	10-4	20	1	26	1	2	46
9	M	10-6	19	1	11	1	2	46
10	M	8-9	24	3	28	3	6	58
11	M	8-7	20	1	36	6	7	61
12	M	9-4	38	7	44	10	17	91
13	F	8-10	9	1	23	2	3	49
14	F	9-1	7	1	11	1	2	46
15	M	10-7	30	4	36	5	9	67

*Age was reported as year/month

Table 1 showed that the age of the 13 boys ranges between(7-4: 10-10)and their standard scores of the Locomotor skills range from 1 to 7,and those of the object control skills range from 1 to 10. The age of the 2 girls ranges between (8-10: 9-1).Their standard scores of the Locomotor skills were 1 and they range from 1 to 2 with regard to the object control. GMDQ for boys ranged from 46 to 91 and for girls from 46 to 49.

Table 2 indicates the Locomotor, Object Control Standard Subtest Scores and the Gross Motor Development Quotient (GMDQ) for the boys (n=13) and the girls (n=2) (See Table 2).

Table (2)

Locomotor, Object Control Standard Subtest Scores and the Gross Motor Development Quotient (GMDQ)

Variable	Boys(n=13)				Girls(n=2)			
	M	**SD**	***Variance***	**ES**	**M**	**SD**	**variance**	**ES**
Locomotor Subtest	2.15	1.77	3.14	2.62	1.00	.00	.00	3.00
Object Control Subtest	3.15	2.76	7.64	2.28	1.50	.71	.50	2.83
GMD Q	55.92	12.57			47.50	2.12		3.50

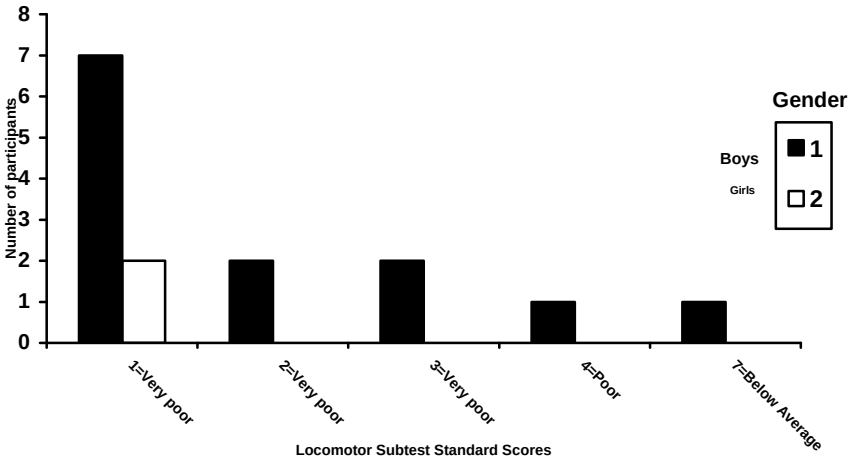
Table 2 shows that for Locomotor and object control skills, the mean converted standard scores for the boys is (2.15- 3.15) and their standard deviation is (1.77-2.76), whereas the mean standard scores for girls is (1.00-1.50) and their standard deviation is (0.00-0.71), taking into account that the mean score of TGMD-2 is 10 and its deviation is 3 for both subtests. A great variance was noticed between boys and girls as for the Locomotor and object control skills; as the boys' variance as regards the Locomotor skills is 3.14, whereas the girls' is 0.00. The boys' variance with regard to the object control skills is 7.64 and the girls' is 0.71. The girls' poor variance may be due to having a small sample in this study.

The boys' mean GMDQ was 55.92 and the confidence limits of the boys' sample at the confidence interval of 95% were (62.75 and 49.11); whereas the girls' mean GMDQ was 47.50 and the confidence limits of the girls' sample at the confidence interval of 95% were 50.45 and 44.55, taking into account that the mean GMDQ of TGMD-2 sample was 100 and its standard variation was 15.

The effect size (ES) of all the participants manifested large differences in the Locomotor skills, object control skills and gross motor development with a percentage more than 97.7% (Cohen, 1988). By comparing the outputs of the Locomotor skills, object control skills and GMDQ with the standards of TGMD-2, there were statistically significant differences in favor of the mean converted standard scores of the sample of TGMD-2 ($p<.01$).

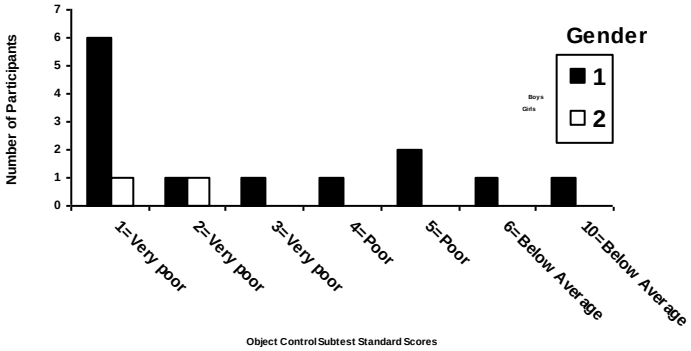
According to the performance descriptive ratings listed in TGMD-2, 93.33% of the participants (12 of the boys and both girls) were placed in the *poor and very poor* categories, whereas only one boy was placed in the *below average* category with regard to the Locomotor skills (See Figure 1).

Figure 1- Average Locomotor Subtest Scores by Gender



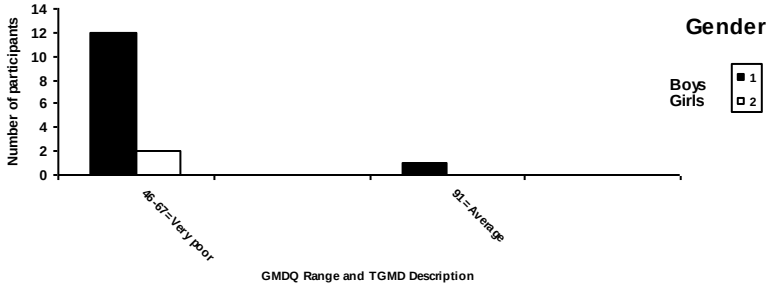
According to the performance descriptive ratings listed in TGMD-2, 86.67% of the participants (11 of boys and both girls) were placed in the *poor and very poor* categories, whereas one boy was placed in the *below average* category and another boy was placed in the *average* category with regard to the object control skills (Figure 2).

Figure 2- Average Object Control Subtest Scores by Gender.



All participants were seriously delayed in the performance of all the motor skills, as 93.33% of the participants were placed in the *very poor* category (12 boys and 2 girls), whereas only one boy was placed in the *average* category with respect to GMDQ according to the performance descriptive ratings in TGMD-2. (See figure 3)

Figure 3- Average GMDQ Scores by Gender



Discussion

The results show the poor level of the motor skills of participants, with reference to the TGMD-2 criteria. The performance of boys generally exceeds that of girls, with the differences between the genders increasing as the intensity of needed supports increases (Eichstaedt et al., 1991; Londeree&Johnson, 1974). Several references showed the poor level of the fundamental motor skills of children with intellectual

disability (Eichstaedt & Lavay, 1992; Jansma& French, 1994; Sherrill, 1998).

Despite this poor level of motor skills, many studies with different academic methodologies reach the same result that these skills can be developed if the programs are well performed and provided by a qualified teacher (Mohammed, 2004; Nawal, 1981; Salah, 1992), Adapted physical education national standards include the understand motor attributes such as low levels of health-related physical fitness and motor ability for them (Kelly, 2006).

This poor performance is due to the deficient evaluation of participants; as the special education curriculum of the students with intellectual disability includes guidelines for the teacher, to be able to achieve course objectives. These guidelines stipulate that "the teacher must not move from one skill to another, unless s(he) is certain that the child masters it, and s(he) has to record any change in the child's behavior, whether this change is for the better or the worse, in the follow-up record"(Special education curriculum for the academic year 2011/2012, p.6). Nevertheless, the files of participants did not include any evidence that they underwent an evaluation. Due to this deficiency, the school and the physical education teacher were not aware of this weakness in the motor skills performance on the one hand and did not determine the effectiveness level of the provided program on the other. Accordingly, no intervention strategies were developed for the adaptation of this program, which is deemed to be the most important objective of evaluating the motor skill and one of the adapted physical education national standards (Burton & Miller, 1998; Eichstaedt & Lavay, 1992; Kelly, 2006).

The results showed that the performance of Locomotor skills by the participants was lower than their performance of the object control skills the scores of 50% of girls with regard to the Locomotor skills were less than their scores with regard to the object control skills. The boys showed poor performance of the Locomotor skills by 92.31% and poor performance of the object

control skills by 84.62%, maybe due to The physical education curriculum for this age group includes a number of object control skills more than the Locomotor skills; as the Locomotor skills listed in this curriculum includes (walk, run, and horizontal jump) whereas the object control skills include (catch, kick, shot, throw, and rolling a ball) (Special education curriculum for the academic year 2011/2012); a fact which reflects the poor balance and sustainability of distributing the curriculum consistently (Raniah, 1998). This can also be attributed to the diversity of tools used for measuring this aspect of the skills by applying the test, whereas there are many balls and baseball bat. Accordingly, these tools were unfamiliar to the students and they were extremely excited to perform and react better than they did with regard to the Locomotor skills.

The results showed high variance of boys' scores and a little variance of girls' scores with regard to the skills of the subtests of the TGMD-2 is likely due to the small size of the girls' sample. However, this variance embodies the statistical properties of the community; as the number of the girls to the boys is 1:4, according to the number of the students attending the special education schools for the children with intellectual disability at the age 7-10 years, as their number is 25, of which there are 5 girls and 20 boys.

Conclusions and Recommendations

The results demonstrate a significant delay in all the components of TGMD-2 with respect to the level of Locomotor, object control skills and GMDQ of participants in this study. The findings support the need to assess the gross motor development of children with intellectual disability, and the importance of training programs for adapted physical educators to use evaluation instruments. Therefore, we recommend the generalization of applying TGMD-2, the foreign or Arab version, to all the special education schools for children with intellectual disability in Egypt, due to the efficiency of this test in evaluation. Furthermore, we advise the officials in charge of preparing the curriculum of physical education for these

children in the Ministry of Education to develop it in such a manner that achieves balance in the content, progression and sustainability, for achieving the objectives of the curriculum and so that students can derive the maximum benefit from the curriculum .

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