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Designing a Scale for Detecting Children with Poor Motor Performance Aged 6 to 9

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Abstract: A physical education teacher cannot detect or identify children with poor motor performance without a valid and reliable scale designed for that purpose. Because such a scale is not available in the Arab environment, the researcher designed a scale to detect or identify poor motor performers aged 6 to 9. The scale was presented to experts in educational psychology, methods of teaching physical education, mental and physical health and sports training at Faculties of Physical Education and Faculties of Education in Egyptian universities. Based on the opinion of the jury of experts, necessary modifications were made. The final version of the scale included 105 statements assigned to five main axes that reflect the manifestations of the poor motor performance of children; motor manifestations, physical manifestations, psychological manifestations, social manifestations and mental manifestations. The scale was administered by a group of fourth-year field training students at the Faculty of Physical Education, Assiut University, after training them in how to administer the scale through observation. Results indicated that the scale could detect and identify children with poor motor performance. Accordingly, the suggested conceptualization of the administration of the scale and necessary educational applications was set.

Key words: Detecting children · Poor Motor Performance · Aged 6 to 9

INTRODUCTION

Physical education in many kindergartens and the first three primary grades in Egypt is still a secondary, not primary, issue although it has been integrated into the school schedule. It is rarely implemented regularly as is the case with other children's activities and hobbies or as is the case with the education and training of children in the principles and concepts of mathematical operations and the development of reading and writing aptitude skills. Although play and movement is considered an innate and natural tendency of children, it has not been exploited using its sound scientific principles and foundations, despite children's need for play, movement and motor excitement which are necessary for their physical, motor, social and psychological development

Dieter [1] emphasizes that inadequate attention paid by teachers to motor education in educational plans, inadequate consideration of it in basic education schedules and the explicit lack of places devoted to practicing sport and of the furnishing and equipment of sports halls and play places will lead the child to suffer from severe deficiency in motor abilities, poor adjustment which will reach a percentage of 40% and poor behavior which will reach a percentage of 45% (For more information see [1].

In their book “Spiel-Spass-Sport Fuer Kinder". Dieter and Ulrich [2]hoped that many children will be able to practice their motor activity at this age; therefore, the most important thing for making pre-school and primary school children fully aware of the world and develop their personalities is to have wide and large empty rooms to maximize their motor activity so that the child's body at this age starts to feel, coexist, understand, contact kinetically and understand all that is related to his/her and other bodies, which is a fundamental part of the child's maturity and development, because the need to move greatly decreases due to the prevention or lack of movement because of the presence of complicated rules for movement and lack of places available and appropriate for movement.

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Through his theoretical readings, applied studies and reviewing previous literature and in consistence with Koschel and Brinkmann [2], the researcher thinks that besides the negative social and psychological effect on the development of the child's personality and because of lack of movement, other symptoms appear in children which the researcher call "poor motor performance" represented in physical weakness that has clear symptoms, some of which are general symptoms such as poor concentration, exhaustion and lack of desire for moving and some others are sensory symptoms that reflect on the muscles and their efficiency, the heart, the blood circulation, respiration, the nervous system and kinetic ability.

These children are in bad need of supplementary physical and kinetic programs that enable them to overcome the consequences of lack of movement and lack of desire for developing. A physical education teacher cannot detect or identify these children without a valid and reliable scale designed for that purpose. Because such a scale is not available in the Arab environment, the researcher designed a scale to detect or identify children with poor motor performance aged 6 to 9.

Study Objectives: The present study aimed at standardizing the scale of the detection of children with poor motor performance aged 6 to 9.

Study Questions: The study aimed at answering the following questions:

- What are the indicators of the validity of the scale for detecting children with poor motor performance aged 6 to 9 in the Egyptian environment?
- What are the indicators of the reliability of the scale in the Egyptian environment?
- What are the criteria for performance on the scale in the Egyptian environment?
- How far is the scale able to detect children with poor motor performance aged 6 to 9?

Terminology of the Study

Weakness of Motor Performance: It is a kind of physical weakness that emerges obvious as a result of motor prevention. It has its own common manifestations such as little ability of concentration, instant fatigue and unwillingness to move. It has also other sensory manifestations that appear on muscles, heart, blood circulation, breathing, nervous system and motor ability, in spite of the child's need for play, movement and necessary motor excitation that is considered essential for physical, motor, social and psychological growth among children [3].

MATERIALS AND METHODS

Methodology Used: The researcher used the descriptive method (for survey studies) as it is most convenient to this study.

Study Population and Study Sample: The study population comprised the first three grades of the elementary school in Assiut governorate. The study sample included 2400 of both male and female children; 750 of them were administered the scale during the second stage, after showing it a panel of experts in the field and 1650 were administered the scale during the third stage, through teachers' observation for determining performance standards on the scale on detecting children with poor motor performance, until their number reached 33 child. The study sample also included some experts in the field of cognitive psychology, methods of teaching physical education, psychological and physical psychiatry and physical training in faculties of physical education and faculties of education in the Egyptian universities. The sample also included some physical education supervisors. The total number of experts was 33.

Tools for Data Collection: The researcher used the questionnaire, as it is the most suitable tool for the nature of this study. The scale was designed in the form of a questionnaire, which was shown to the 33 specialized experts (Appendix 1).

Appendix 1:

Assiut University Faculty of Physical Education Curriculum and Teaching of Physical Education Dept. Dear Prof/ A Scale for Detecting Children with Poor Motor Performance Aged 6 to 9

General Information on the observed Child:

Name:	School:
Date of Birth:	Work of the Father:
Height:	Work of the Mother:
Weight:	Score on the Intelligence Test:
Date of Administration:	Date of End of Administration:

Administration Instructions Dear Teacher/

This scale comprises a number of statements that express some aspects that seem obvious on some of your schoolchildren and that all agree on them. You are requested to read each statement carefully and then start observing aspects on those children, which are expressed by these statements. After that, tick (?) before one of the three gaps that expresses your point of view. (Very Clear - Clear - Not Clear).

- Do not take much time in thinking of responding to each statement. Give your response at the first observation of the aspect that seems obvious on the child.
- Carry on observing those children till you finish responding to all statements.
- Do not leave a single statement unobserved and consequently un-responded to whatever the time it takes in observation.

Thanks for your sincere cooperation

The First Core: Kinetic aspects

No.	Statements Expressing Kinetic Aspects	Very Clear	Clear	Not Clear
1	Do not control moving his body's centre of gravity from one foot to the other while throwing a tool.			
2	Increases side movements while using one of his arms.			
3	Does some sort of irregularity in movement as a result of the weak control over his body parts.			
4	Exaggerates using one of his body organs while harmonious motor performance among different body parts.			
5	Finds difficulty in Leaping above and the preliminary stage for the next stage seems as if it is separated from the final stage of the first leap.			
6	Finds too much difficulty in learning any new kinetic skill compared to his peers.			
7	Finds difficulty in connecting between the stages of the kinetic skill as a result of poor memory.			
8	Takes a longer time to learn the kinetic skill as compared to his peers.			
9	Bending or falling of the head forward or towards one of the sides of the body during walking.			
10	Excessive divergence of the feet during walking.			
11	Finds difficulty in changing side directions.			
12	Takes longer time in carrying out the performance in the specified direction.			
13	Fails in walking while perusing a straightforward or a curved line drawn on the ground.			
14	Finds difficulty in connecting his visual and kinetic perception.			
15	Finds difficulty in learning skills that require harmony between eye and foot as in passing the football.			
16	Finds difficulty in learning skills that require harmony between eye and hand as in throwing the ball or passing it with the hand.			
17	Fails to control the ball while receiving it by hand or foot.			
18	Performs the stage of flaying in running in a wrong way and without harmony between the two arms and the two legs.			
19	His kinetic performance has no creation.			

The Second Core: Bodily aspects

No.	Statements Expressing Kinetic Aspects	Very Clear	Clear	Not Clear
1	Performs The position of standing up from sitting in a wrong way.			
2	Performs The position of sitting down from standing slowly and hardly.			
3	Finds difficulty in leaping with rope.			
4	Finds difficulty in perusing rhythm in rhythmical exercises.			
5	Cannot trace rhythms in rhythmic trainings with the two feet or with the two hands or with the two feet and the two hands together.			
6	Cannot jump up and descend at the same place.			
7	Cannot keep the two feet adjacent while jumping up.			
8	Cannot keep balance while performing some derived positions in training.			
9	Cannot perform side walking on the Swedish chair or the balance board.			
10	Finds difficulty in turning left.			
11	Avoids using the left-hand side of his body.			
12	Finds difficulty on standing on his toe tips.			
13	Finds difficulty in picking stationary tools from the ground easily and quickly.			
14	Finds difficulty in picking moving tools from the ground easily and quickly.			
15	His kinetic performance lacks smoothness because of the irregular work of muscles.			
16	His kinetic performance lacks harmony because of the lack of collaboration the work of the nervous system and the muscular system, on the one hand and the senses, on the other hand.			
17	He\she suffers from observed muscular atrophy.			
18	He\she suffers from rabid fatigue and the symptoms appear on him\her very clear.			
19	Shows rigid positions that lacks flexibility while kinetic performance.			
20	He\she suffers from inability to control his body parts.			

The Third Core: Psychological aspects

No.	Statements Expressing Kinetic Aspects	Very Clear	Clear	Not Clear
1	Feels confused while receiving the ball and the symptoms of confusion appears on him\her.			
2	His\her body movements become confused while receiving the ball or any other tool.			
3	His\her feet become confused while performing side movements.			
4	Moves in an exaggerated way and do not comply with the specified place.			
5	Do not comply with the formations inside his group and tends to move haphazardly.			
6	Finds difficulty in concentration and he\she is easily distracted.			
7	Finds difficulty in paying attention for a long time.			
8	Do not respond directly to movement performance and shows a short period of attention.			
9	Finds difficulty in a skill performance after watching it for the first time during the model and needs extra shows.			
10	Shows a state of hyperactivity that appears in his haphazard and aimless movements.			
11	Do not recognize his proper position during teamwork			
12	Pretends illness in order to avoid practicing physical and kinetic activity.			
13	Feels as if he is not desired during physical and kinetic activities.			
14	Do not feel fun and joy while doing physical performance.			
15	Nervous and do not control his/her passivities during play and his nervousness appears.			
16	Feels afraid from practicing play and do not trust his abilities for kinetic and physical performance.			
17	Do not care for whatever mistakes he/she commits in the playground.			
18	Do not take the responsibility for his kinetic mistakes.			
19	Do not care if he fails in kinetic performance.			
20	Anxious and tense upon participating other children in play.			

The Fourth Core: Social aspects

No.	Statements Expressing Kinetic Aspects	Very Clear	Clear	Not Clear
1	Avoids group performance in the physical education class.			
2	Do not depend on himself in kinetic performance but on others in group performance.			
3	Do not participate in the preparation for the physical education class.			
4	Gives many instructions to the teacher.			
5	Thinks that his role is not effective inside his classroom and do not recognize his role within a group.			
6	Do not show willing for the participation of his class in playing or in any other physical pr kinetic activity.			
7	Do not care if he sees someone playing with the physical education tools and machines.			
8	Refuses giving hand to his class members and prevents others helping them.			
9	Contradicts regulations and rules in the physical education class.			
10	His own benefit is above anything and usually prefers his own benefit for that of the others.			
11	Do not apologize if he/she offends any of his classmates during the class or during free activities.			
12	Finds difficulty in representing the roles of others.			
13	Do not know what to achieve and lacks self confidence.			
14	Tends to be alone and prefers to be the last.			
15	Refuses cooperation with others in using available tools.			
16	Regresses to childish behavior if he/she is confronted with a difficult situation.			
17	Slow in adapting himself to new situations.			

End of the Scale Statements

RESULTS AND DISCUSSION

First: To answer the first question "What are the indicators of the validity of the scale for detecting children with poor motor performance aged 6 to 9 in the Egyptian environment?" ,the researcher calculated the arbitrator and factor analysis validity of the scale as follows:

Arbitrator Validity: The researcher presented the initial version of the scale which consisted of 120 statements to some experts in educational psychology, methods of teaching physical education, mental and physical health and sports training at Faculties of Physical Education and Faculties of Education in Egyptian universities as well as to some physical education supervisors to determine if each statement belonged to the dimension to which it had been assigned and to check clarity of wording. The fifth manifestation "the mental manifestation" was excluded and some of its statements were included in the fourth manifestation "the psychological manifestation" and the third manifestation "the social manifestation". Some statements were modified until the number of statements, based on the jury opinion, was 80 statements. After administering the scale to a sample of children, five statements were excluded until the final version of the scale included 75 statements. The percentage of agreement was 0.87, which indicates the validity of the scale.

The researcher also used the method adopted by Abdel-Rahman [3] and Ali [4] to poll the opinions of the arbitrators (preferably 30 arbitrators). The arbitrator is asked to circle the number, which best measures, the characteristics to be measured. This method is based on a score of 0 to 10 to be placed in front of each of the statements of the scale, which consists of 105 statements. Then the opinions of the arbitrators are taken and the arbitrator is asked to circle the number of the statement which best measures the characteristics to be measured. If the statement completely measures the statement, he circles number 1. If it does not measure the statement at all, he circles "zero" regardless of the direction of the statement. In this way, the response can be scaled from zero to 10. The validity coefficient of each statement is calculated using the following equation:

$$V = M + \frac{0.05 + \sum n}{MR}$$

Where V is the validity coefficient of the statement, M is the minimum mean interval, $\sum n$ is the sum of the ratios falling before the mean interval and MR is the mean ratio.

The validity coefficients of the statements were calculated using a computer statistics program and the validity scores for the statements of the scale were calculated using the program prepared for that purpose. Insignificant statements were excluded and the final version of the scale included 75 statements. Table 1 shows the numbers of the statements of the scale and the validity coefficient of each statement.

Factor Analysis Validity: To make sure that the scale is valid, the researcher used the factor analysis method through the main components suggested by Hottelling for the factor analysis of the correlation coefficient matrices. The factor validity of the scale dimensions was calculated and so was the potential square of the four factors (10.13, 6.57, 5.17 and 8.63, respectively). The ranking criterion of the number of factors having a potential square was set to be a whole one or more. The loading degree acceptable as a fundamental loading was defined in those reaching 0.30 [5].

Table 1: The numbers of the statements of the scale and the validity coefficient of each statement

Statement Number	Validity Coefficient	Statement Number	Validity Coefficient	Statement Number	Validity Coefficient
1	0.74	27	0.56	53	054
2	0.58	28	0.74	54	0.75
3	0.61	29	0.56	55	0.59
4	0.65	30	0.58	65	0.72
5	0.58	31	0.79	57	0.58
6	0.64	32	0.54	58	0.77
7	0.81	33	0.56	59	0.68
8	0.82	34	0.58	60	0.67
9	0.69	35	0.75	61	0.59
10	0.60	36	0.78	62	0.66
11	0.57	37	0.66	63	0.81
12	0.65	38	0.75	64	0.64
13	0.56	39	0.59	65	0.83
14	0.64	40	0.71	66	0.73
15	0.76	41	0.74	67	0.68
16	0.66	42	0.76	68	0.56
17	0.76	43	0.57	69	0.81
18	0.57	44	0.84	70	0.55
19	0.66	45	0.61	71	0.52
20	0.62	46	0.63	72	0.72
21	0.84	47	0.79	73	0.81
22	0.83	48	0.56	74	0.67
23	0.76	49	0.82	75	0.74
24	0.82	50	0.61		
25	0.73	51	0.83		
26	0.81	52	0.60		

The above table shows that the validity coefficients range between 0.52 and 0.84 with a mean of 0.68 and these are good validity coefficients.

Table 2: The factors or manifestations of the scale and the loading of the statements belonging to each factor or manifestations

Factor 1		Factor 2		Factor 3		Factor 4	
Statement Number	Loading on the Factor	Statement Number	Loading on the Factor	Statement Number	Loading on the Factor	Statement Number	Loading on the Factor
1	0.80	2	0.65	3	0.49	4	0.78
5	0.60	6	0.48	7	0.88	8	0.65
9	0.81	10	0.55	11	0.61	12	0.85
13	0.61	14	0.85	15	0.41	16	0.71
17	0.65	18	0.75	19	0.43	20	0.63
21	0.55	22	0.78	23	0.69	24	0.55
25	0.62	26	0.82	27	0.74	28	0.66
29	0.63	30	0.73	31	0.75	32	0.82
33	0.82	34	0.65	35	0.83	36	0.78
37	0.84	38	0.55	39	0.61	40	0.69
41	0.75	42	0.79	43	0.55	44	0.65
45	0.74	46	0.89	47	0.67	48	0.87
49	0.53	50	0.64	51	0.75	52	0.77
53	0.76	54	0.61	55	0.46	56	0.83
57	0.81	58	0.49	59	0.83	60	0.65
61	0.85	62	0.53	63	0.65	64	0.53
65	0.57	66	0.87	67	0.87	68	0.61
69	0.61	70	0.77	71	0.77		
73	0.72	74	0.65	75	0.65	78	0.83

This Analysis Resulted in Four Factors as Follows:

- The "motor manifestation" factor and this factor loaded on a number of the scale statements. Table 2 shows the numbers of the statements of the scale and their loading on the first factor.
- The "physical manifestation" factor and this factor loaded on a number of the scale statements and the statements that were less than 0.30 were excluded according to Child [5] criterion. Thus, the number of statements for this manifestation was 20. Table 2 shows the factor loading on the statements of the scale.
- The "psychological manifestation" factor and this factor loaded on a number of the scale statements and 6 statements that were less than 0.30 were excluded according to Child criterion. Thus, the number of statements for this manifestation was 19. Table 2 shows the factor loading on the statements of the scale.
- The "social manifestation" factor and this factor loaded on a number of the scale statements and 7 statements that were less than 0.30 were excluded according to Child criterion. Thus, the number of statements for this manifestation was 17. Table 2 shows the factor loading on the statements of the scale.

In the light of the factor analysis validity, the final version of the scale consisted of four main factors: the motor manifestation factor, the physical manifestation factor, the psychological manifestation factor and the social manifestation factor.

Second: To answer the second question "What are the indicators of the reliability of the scale in the Egyptian environment?", the researcher used Cronbach's alpha coefficient to calculated the reliability of the scale. The reliability coefficient of the scale was 0.85, which is significant at 0.01. The researcher also used the internal consistency method to calculate reliability and the reliability of the scale, according to this method, was 0.83, which is significant at 0.01.

Third: To answer the third question "What are the criteria for performance on the scale in the Egyptian environment?", after making sure of the validity and stability of the scale, the researcher used percentiles to find standards for the scale. The researcher set standards for each subscale reflecting the statements of the secondary manifestations, because this was important for diagnosing the deficit in a certain skill or ability. Table 3 shows the standards of each subscale.

Table 3: The standards of the subscales of the poor motor performance detection scale

Subscales	Z score
1. The Motor Manifestation	40
2. The Physical Manifestation	43
3. The Psychological Manifestation	45
4. The Social Manifestation	39
The Entire Scale	158

Table 3 shows the cut-off point which represents the performance was 40 for the first subscale "the motor manifestation", 43 for the second subscale "the physical manifestation", 45 for the third subscale "the psychological manifestation" and 39 for the fourth subscale "the social manifestation". The table also shows that the standard of performance on the entire scale was 158 points.

Fourth: To answer the fourth question "How far is the scale able to detect children with poor motor performance aged 6 to 9?", in the light of the factors applied to the standardization sample that included 1,650 male and female children aged 6 to 9 (M = 4.7 years, SD = 0.3), the researcher asked primary school physical education teachers to give their opinions based on their personal experience with the children (n = 450) including 33 children with poor motor performance (7.33%). After determining the number required in the form of groups each having 15 children, the researcher and teachers administered the scale with the help of physical education student teachers at the Faculty of Education, Assiut University after training them how to administer the scale through observation. The result was that there was significant agreement between teachers' views and children's performance on the scale (89%) and this indicates that the scale is capable of detecting and identifying children with poor motor performance.

Despite teachers' ability to identify a large number of children with poor motor performance and the consistency of this ability with the scale, teachers could not accurately identify the weaknesses in the manifestations constituting the scale or even in a certain area of motor abilities and skills. Rather, their evaluation was general in contrast with the ability of the scale to accurately identify weaknesses in motor performance, which is a characteristic of the scale. This indicates the importance of the scale for detecting children with poor motor performance in general and its ability to identify weaknesses in the light of the objective testing criteria.

Discussion and Interpretation of Results: In the light of the results shown in table 3, it is clear that there are performance standards for the scale as a whole. A child who obtains a total score ranging between 158 and 225 on the scale will be considered to have general weakness in motor performance as the score of 225 refers to the maximum score on the scale. However, there is still need to identify the performance level of each child on the subscales to identify weaknesses more clearly and, accordingly, identify the nature of supplementary programs which a child or group of children need to reach the motor performance level of their ordinary peers.

Therefore, standards were set for each subscale and in the light of these standards, we can identify children with poor motor performance. A child who obtains a total score ranging between 40 and 57 on the scale will be considered to be poor in the motor manifestation as the score of 57 refers to the maximum score on the first subscale "the motor manifestation". If s/he obtains a total score ranging between 45 and 57 on the scale will be considered to be poor in the physical manifestation as the score of 60 refers to the maximum score on the second subscale "the physical manifestation". If s/he obtains a total score ranging between 45 and 57 on the scale will be considered to be poor in the psychological manifestation as the score of 57 refers to the maximum score on the third subscale "the psychological manifestation". If s/he obtains a total score ranging between 39 and 51 on the scale will be considered to be poor in the social manifestation as the score of 51 refers to the maximum score on the fourth subscale "the social manifestation".

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