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Observing and detecting pupils with low motor competence in school physical education

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ABSTRACT

The purpose of this study was to examine the precision with which physical education teachers observe and evaluate the motor competence of schoolchildren in the gymnasium and on the playing field.

To achieve this end about 50 physical education teachers observed 764 schoolchildren of both sexes, from 4 to 14 years of age, using the ECOMI Observation scale developed by the authors.

The results of the different analyses carried out showed the psychometric quality of the instrument (high reliability and adequate validity) as well as its relevance for use as an instrument of detection given the close relationship between the pupils detected using the Movement Assessment Battery for Children and those detected by the teachers with the ECOMI scale.

This study shows how school physical education teachers are able to detect those pupils who have motor competence problems, if they are offered a suitable observational instrument.

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Introduction

Different research studies have indicated that physical education teachers are not able to detect pupils with developmental motor coordination problems, based on the argument that the teachers lack professional training in these aspects of children's motor behaviour (Revie and Larkin, 1993).

Many researchers have constructed observational instruments to be used quickly and efficiently by teachers in their gymnasia and on their playing fields (Revie and Larkin, 1993; Vodola, 1974; Kalverboer and Van Dellen, 1990 or Henderson and Sugden, 1992).

These instruments include a set of schoolchildren's competencies which are evaluated *in situ* by the teachers and which embrace a wide range of behaviours, from gross to discrete motor tasks.

This study was carried out as part of a more extensive project on developmental problems of motor coordination at school age, for which an observational scale called ECOMI (Children's Motor Competence Observation Scale) was designed to be used by the teachers and contrasted with the results obtained with the Assessment Battery for Children by Henderson and Sugden (1992) in these same pupils (Ruiz, Graupera, Gutiérrez and Mayoral, 1997).

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Method

Populations and Samples

Fifty teachers working in the Autonomous Communities of Madrid and Valencia participated in this study and assessed 786 schoolchildren of both sexes of between 4 and 12 years of age (mean age = 8.51, S.D. = 2.56).

Instrumentation

In order to be able to evaluate the schoolchildren's motor competence the ECOMI (Children's Motor Competence Observation Scale) was developed with 32 items representing situations of differing complexities, which frequently occur in physical education sessions. This form is based on the opinion of experts who considered that these settings could be of use to detect those pupils who have difficulty in their movements.

The presentation of each of the items used a Likert type scale of 4 points, in which **1** indicated the absence of the behaviour, that is the expression of difficulty, and **4** its habitual presence or the expression of competence. Its purpose was therefore not to serve to detect the most competent but rather those who have difficulty in physical education sessions.

Procedure

The ECOMI Observation form was given to the teachers of the classes studied by those collaborating in the project. Once the contents had been analyzed and any doubts explained, they were told to observe the pupils in their class on different occasions and not to complete the form after only one observation.

The completed forms were returned after a month. Constant contacts were maintained in order to resolve any difficulties or doubts.

Results

Psychometric analysis of the ECOMI scale.

To analyze the validity of the construct of this new instrument, a factorial analysis was performed (the principal components method, Varimax rotation) which allowed us to extract three factors thus decreasing the scale to 22 items,

which together accounted for 62.61% of the variance. The factors are the following, according to the denomination which we have adopted:

1. **General Motor Competence** (12 items, accounting for 27.47% of variance)
2. **Motor Control** (7 items, accounting for 20.20% of variance)
3. **Directionality** (3 items, accounting for 14.93% of variance).

With regard to the reliability (Cronbach's Alpha) of the subscales corresponding to each of the three factors extracted, the following results were obtained:

- **General Motor Competence** (12 items, Alpha = 0.93).
- **Motor Control** (7 items, Alpha = 0.92).
- **Directionality** (3 items, Alpha = 0.74).

These values can be considered as very acceptable for this type of instrument.

The analysis of items we carried out offers indices of homogeneity (item-scale corrected correlation) which oscilate between 0.57 and 0.79 in the first factor, between 0.73 and 0.77 in the second, and between 0.41 and 0.67 in the third.

Differential analysis by groups.

A multivariable analysis of variance, taking the three factors found as dependent variables, and age and sex as independent variables, offered the following results:

1. **Contrasts according to sex**: differences were found in the multivariable analysis ($F=6.676$, $p<0.001$), in the first two factors: General Motor Competence (ECOMI1: $F=8.235$, $p=0.004$) and Motor Control (ECOMI2:$F=4.054$, $p=0.044$). In both cases the differences were favourable to the boys.

2. **Contrasts according to age**: differences were found in the multivariable analysis ($F=22.641$,$p<0.001$) in the three factors: General Motor Competence (ECOMI1:$F=26.212$, $p<0.001$), Motor Control (ECOMI2: $F=66.203$, $p<0.001$) and directionality (ECOMI3: $F=54.938$, $p<0.001$). In all cases the differences indicated an increase in score with advancing age.

3. **Contrasts in the sex/age interaction**: Interaction was found in the multivariable analysis ($F=1.524$, $p<0.049$) in the second factor: Motor Control (ECOMI2: $F=2.207$, $p<0.025$). The scores begin to be systematically favourable to boys from 8 years on, at the earlier ages (4 to 7) there is not such a clear sex differentiation.

Relationship between the ECOMI results and the Movement ABC results

As part of the project which included this study, Henderson and Sugden's (1992) Movement ABC was administered to the schoolchildren in the sample. Once the data had been processed, the sample was divided in each age group according to the overall score in the ABC Test. The 15th percentile was chosen as the cut-off point in the division which decided which pupils had motor coordination problems (PECM), resulting in the formation of two groups, one without motor competence problems which numbered 754 pupils and others with motor competence problems which numbered 144 subjects. Thus the Group with motor competence problems was made up of those subjects whose score was below the 15th percentile.

An analysis of the relationship between these results in the motor battery and the observations of the teachers revealed:

- **4 - 6 year olds**: Significant differences in the General Motor Competence factor and Directionality (Lower scores in the PECM (Developmental Motor Competence Problems) group.
- **7 - 8 year olds**: Significant differences were found in General Motor Competence, Motor Control and Directionality (Lower scores in the PECM group).
- **9 - 10 year olds**: Significant differences were found in General Motor Competence, Motor Control and Directionality (Lower scores in the PECM group).
- **11 - 12 year olds**: Significant differences were found in Motor Control (lower scores in the PECM group).

Discussion

The analysis of the results reveals an ascendent developmental pattern in the three factors measured. In a similar way to other earlier studies sex differences are found which favour boys in tasks of general motor competence and motor control.

At the same time, in the case of motor control, the differences can be seen to begin to stand out after the age of 7.

In addition the instrument shows good psychometric quality (high reliability and adequate construct validity)

with a decreased number of items, which makes it easy to apply in a school context.

This study confirms that teachers are capable of detecting subjects with difficulties if they are offered an instrument which is easy to use, an aspect which will favour the possibility of earlier intervention. Teachers are capable of detecting schoolchildren with PECM in all age ranges.

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APPENDIX

Children's Motor Competence Observation Scale

ECOMI

Teacher:
Pupil:
Sex:
Date of birth: **Year:** **School:**

Instructions for the Teacher:

For each item please circle the option which most accurately represents the usual behaviour of the pupil. The options and number code (from 1 to 4) which correspond to them are as follows:

1 = **never or rarely; 2 = sometimes; 3 = frequently; 4 = always or almost always**

1. S/he recognizes the parts of the body without difficulty, and those which belong to the left and the right.

2. S/he runs about the gymnasium without bumping into classmates or objects.

3. S/he hops forward on the left foot in a controlled manner at least 10 times without stopping.

4. The same on the right foot at least 10 times without stopping.

5. S/he catches a ball with both hands in a controlled manner (thrown from a distance of 2 - 3 meters)

6. S/he can keep time while performing (clapping to music, playing a tambourine to music, walking in time to music)

7. S/he maneuvers with agility round the obstacle courses.

8. S/he moves like children of her/his own age.

9. S/he understands directions (up-down, left-right, etc.)

10. S/he is able to bounce a ball with one hand continuously

while standing still.

11. S/he is able to bounce a ball continuously with one hand

while moving around.

12. S/he hits a ball back with a racket or bat in a controlled manner.

13. S/he can balance on one foot for more than 30”.

14. S/he is able to jump continuously on the spot on one foot (in a space of 50 cm x 50 cm a maximum of 50 times)

15.S/he can catch a tennis ball with two hands in a controlled manner.

16.S/he can catch a tennis ball with one hand in a controlled manner.

17.S/he is able to run and stop to avoid bumping into a class-mate or object.

18.S/he has an overarm ball throwing pattern and performs it skillfully.

19.S/he learns the skills in the physical education program well.

20.S/he takes part in sports and ball games with her/his class-mates in a competent manner.

21.S/he shows a clear preference for one side of the body in tasks like throwing, kicking, bouncing the ball, etc.

22. S/he performs automatically the same type of movements as those performed by her/his classmates