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Use of the Bruininks-Oseretsky Test of Motor Proficiency, second edition in school practice

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Abstract

Introduction. Physical inactivity is a global public health problem. One of the most important factors, which influence the later participation of children in regular physical activities, is sufficient movement competence level. The Bruininks-Oseretsky, 2nd version, test is considered the most comprehensive diagnostic tool for estimation of motor proficiency. It is used in the field of psychomotricity diagnostics in the Czech Republic. However, there are no Czech normative criteria. Aim of Study. The aim of this study is to investigate the usefulness of the Bruininks-Oseretsky Test of Motor Proficiency, 2nd version for both diagnostic and evaluative purposes in school practice. Material and Methods. The research sample was made of 45 primary school children (23 girls and 22 boys) of average age 9.2 ± 1.4 years. For the estimation of a motor proficiency we used the Bruininks-Oseretsky test, 2nd version – complete form with German normative criteria. Results: According to the total motor composite performance on BOT™-2, we found 16.7% of children with severe motor difficulties. It can identify the presence of developmental coordination disorder which requires necessary motor intervention. 28.6% of children were in the parameter total motor composite below the average with a risk of motor difficulties. In total, 72% of children had the BOT™-2 score in the 50th percentile or lower. Conclusions. The test is useful and suitable for recognizing signs of different kinds of developmental coordination disorders in school practice. Teachers need to undertake a course to be able to use this test. It is not easy to assess the test battery. The time required for the completion of the test may be too much for some of the children (over 60 minutes). That is why it is recommended to split the test battery into more parts.

KEYWORDS: Bruininks-Oseretsky test, psychomotricity, motor proficiency.

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Introduction

Physical inactivity is a global public health problem. Physical inactivity is an accepted antecedent to the development of childhood obesity and is implicated in numerous chronic conditions including poor cardiovascular and metabolic health among children [24], however, childhood inactivity is rarely purported as the precursor to osteoporosis, a disease typical of old age [4, 14].

The current levels of physical inactivity are partly due to insufficient participation in physical activity during leisure time and an increase in sedentary behavior during occupational and domestic activities [11]. The multitude of factors that induce adults to initiate and maintain programs of physical activity have been divided into those that are invariable (age, gender, race, ethnicity) and those that are presumed to be modifiable (behavioral and personality characteristics, environmental circumstances and community settings). The initiation and maintenance of regular physical activity in adults depends on a multitude of biological and sociocultural variables that demand attention across the lifespan [25].

One of the modifiable factors, which predicts child physical activity participation in adulthood, is the level of fundamental movement skills (FMS). Developing motor skill competence may be fundamental in developing and maintaining adequate physical fitness into adulthood [27]. Children with high motor skill proficiency will have higher levels of fitness and perceived sports competence, which in turn predict greater participation in physical activity, and vice versa [21]. There are positive associations between FMS competency in childhood and participation in adolescent physical activity [1]. However, and often overlooked, evidence suggests that motor skill acquisition in early childhood may be an essential prerequisite for child physical activity participation and engagement in physical activity later in life [20].

Fundamental movement skills are considered to be the building blocks that lead to specialized movement sequences required for adequate participation in many organized and non-organized physical activities for children, adolescents and adults [9]. The sufficient level of fundamental movement skills has been purported as contributing to children's physical, cognitive and social development [12] and is thought to provide the foundation for an active lifestyle [26]. Lubans et al. [21] found strong evidence for a positive association between FMS competency and physical activity in children and adolescents. There was also a positive association between FMS competency and cardio-respiratory fitness and an inverse association between FMS competency and weight status.

Movement competence (MC) is defined as the development of sufficient skill to assure successful performance in different physical activities. Monitoring children MC during maturation is fundamental to detect early minor delays and define effective intervention [2]. According to Lun Fu et al. [22], movement competence is indicated by motor coordination and development of fundamental movement skills (divided into three constructs: locomotive, object control and stability skills).

They are available several MC assessment batteries. To evaluate the level of MC in connection with the selection of an appropriate evaluation tool is a complex issue. An individual's motor development is a complex issue; changes of motor manifestations are accompanied by changes in other functions as well as in physical and psychological development [13].

Bruininks-Oseretsky Test of Motor Proficiency, 2nd version (BOT 2) – complete form [5] is considered to be the most complex tool for the evaluation of the level of movement competence. The BOT 2 in comparison to the other diagnostic tools has shown a more elaborated design of the test structure and the possibility to assess the concept of psychomotricity in the broadest possible age range of the probands [16]. The BOT 2 test achieves high validity and reliability (0.90 up to 0.97) [28].

The aim of this study was to assess the applicability and the suitability of the Bruininks-Oseretsky Test of Motor Proficiency, 2nd version for both diagnostic and evaluative purposes in school practice and to help to facilitate the teacher's evaluation of the level of pupils' movement competence, which is essential for the creation of the individual motor intervention. The goal of motor proficiency diagnostics is to map, with the help of observable, descriptive and measurable variables, humans' motoric manifestations; to create necessary support measures which would lay the basis for changes in motor behavior [29].

Despite being used in the area of psychomotricity diagnosis in the Czech Republic, there is neither Czech translation, nor there are Czech normative criteria. When assessing motor proficiency, the USA criteria are used. However, cultural and socioeconomic factors can influence patterns of physical movement behaviour and consequently the performance of a tested motor task. Chow et al. [8] state that different socio-cultural conditions on different continents could be causes of different results in conducted surveys.

Normative criteria of German speaking countries, which are geographically closer to our country, were used for assessment of our project [3].

Material and Methods

The research design draws on the classical theory of tests [17] and current approaches to psychomotricity diagnostics of motor competence [15].

Participants

The research sample was made of 42 primary school children (23 girls and 19 boys) of average age 9.2 ± 1.4 years. Parents of the children all agreed on the terms concerning the testing.

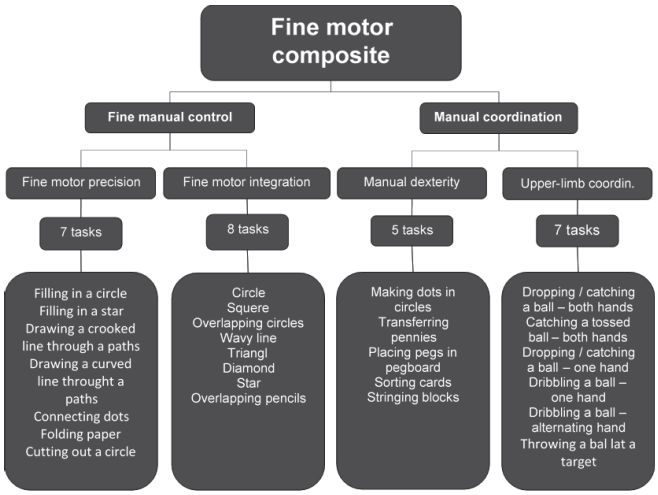
Procedures

BOT 2 – 2nd edition, complete form [5] was used for the evaluation of motor proficiency. Normative criteria of German speaking countries were used for the assessment [3]. The test of one person lasted around 90 minutes. Analysis of the results lasted around 60 minutes.

In the area of fine and gross motor development we evaluated total motor composite, 4 motor area

composites (fine manual control, manual coordination, body coordination, strength and agility) with 8 subtest comprised of 53 items in the categories fine motor precision and integration, manual dexterity and upper-limb coordination, bilateral coordination and balance, running speed and agility, strength (Figure 1).
Scores for the test are reported as total point scores, standard scores, percentile ranks and developmental age. Minimum and maximum scores are as follows: Total point scores: 0 to 320, Standard scores: 20-80, Percentile ranks: 1 to 99.

Figure 1. BOT 2 – fine motor composite with subtest and tasks

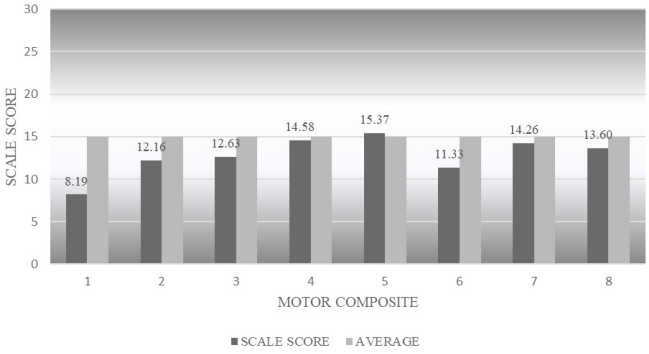


Statistical analysis
Mathematical functions of Microsoft's Excel program such as arithmetic average, standard deviation, percentages and scatter charts were used for the analysis of the results.

Results

Results of particular subtests are shown in Figure 2. There are average results of eight categories: fine motor precision and integration, manual dexterity and upper-limb coordination, bilateral coordination and balance, running speed and agility, strength.

Figure 2. Results of BOT 2 – scale score



Note: Motor composite: 1. fine motor precision, 2. fine motor integration, 3. manual dexterity, 4. upper-limb coordination, 5. bilateral coordination, 6. balance, 7. running speed and agility, 8. strength

In the Table 1 there are reported results of composite score profile (fine manual control, manual coordination, body coordination, strength and agility) and total motor composite score.

Discussion

The results of our tested group show that the group's motor proficiency is in the lower part of the average level in the area of total motor composite.
On average, the weakest performance was recorded in the area of fine manual control. The group's results were below average in this area. More in-depth analysis showed that the weakest subcomponent of the area of fine manual control was fine motor precision. The group's performance was average in the subcomponent of fine motor integration. The second weakest result of the area of motor composite was in the area of body coordination, where the results were in the lower part of the average level. This was caused by poor results in the balance subcomponent. The rest of components in composite score profile was analyzed and placed in the average level. The group's most successful area was the component concerning strength and agility.
The individual assessment showed that 16.7% of children have severe motor difficulties. Their results were in all tested categories well below average. It can identify the

Table 1. Standard score (T-statistic) in 4 composite areas – fine manual control, manual coordination, body coordination, strength and agility and total motor composite score

	Fine manual control	Manual coordination	Body coordination	Strength and agility	Total motor composite
	M = 50, SD = 10	M = 50, SD = 10	M = 50, SD = 10	M = 50, SD = 10	M = 50, SD = 10
M	38.07	46.40	45.95	47.02	42.74
SD	11.46	12.73	9.93	13.51	12.12

presence of developmental coordination disorder which requires necessary motor intervention. Without the early intervention these problems will not be eliminated by ontogenetic development and they will remain into adulthood [19]. Children with developmental coordination disorder show less physical activity than healthy children and this deficit reflects in their lower level of health-related fitness and higher occurrence of overweight and obesity as risk factors of civilization illnesses [6]. Prevalence of motor difficulties affects around 5-6% of the school children population [23], around 10% of children show signs of milder symptoms [10]. According to Kirby [18], the number of children with dyspraxia has been increasing for the last 15 years. The increase is related to the change in lifestyle in favour of hypokinesia, inappropriate diet, the predominance of PC work over manual work, stress, and rapid pace of teaching.

28.6% of children were in the parameter total motor composite below the average with a risk of motor difficulties. Performance of these children was evaluated in one of the categories as well below average.

In total, 72% of children had the BOT™-2 score in the 50th percentile or lower. These findings could be explained by the low level of socioeconomic status of the area in which the school is situated. The low level of socioeconomic status can significantly influence the results of psychomotricity diagnostics.

Results of the BOT™-2 testing enable individual evaluation of the level of motor proficiency and motor development. Practical consideration for the test: the test is useful for recognizing signs of different kinds of developmental coordination disorder in school practice. The disadvantage is that the test requires a considerable amount of time. Assessment of one person takes around 90 minutes if everything is well-planned. The analysis of the results of one person requires around 60 minutes. Even though, the authors officially state the time of 13 to 20 minutes. Teachers need to undertake a course to be able to use and evaluate this test.

The time required to complete the test might be too long for some of the children (over 60 minutes). Some of the children showed signs of fatigue and it would be more beneficial to split the test battery into more parts. The short version of the test seems more suitable, but some researchers [7] warn about the need to revise short form BOT 2 to include more items which are all significantly correlated with their subtest scores.

Conclusions

Results of the testing enable individual evaluation of the level of motoric development, not only by using results of overall motoric scores, but also by using detailed evaluation in all 8 categories. 16.7% children from the overall number of 42 children were diagnosed with severe insufficiency in some of the subcategories, which requires necessary motoric intervention. 28.6% children were diagnosed with mild insufficiency, which requires motoric intervention aimed at specific area of motoric behavior. Total below average results of our sample group can be related to testing in the geographic area with the low level of socioeconomic status.

Practical consideration for the test: the test is useful for recognizing signs of different kinds of developmental coordination disorder in school practice. Teachers need to undertake a course to be able to use this test. It is not very easy to assess the test battery. The time required to complete the test might be too long for some of the children (over 60 minutes). That is why it's recommended to split the test battery into more parts.

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