COORDINATION SKILLS IN 9 TO 11 YEARS OLD PUPILS AT PRACTICAL ELEMENTARY SCHOOLS IN RELATIONSHIP TO THEIR DEGREE OF INTELLECTUAL DISABILITY

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BACKGROUND: The degree of pupils' intellectual disability is regarded as the fundamental criterion for a necessary internal differentiation in the physical education teaching process at practical elementary schools. Up to now, children with intellectual disability, or pupils at practical elementary schools, have not received, in this regard, so much attention, neither in the area of research nor in the teaching process.

OBJECTIVE: The aim of the conducted study was to identify the level of selected coordination skills in 153 9 to 11 years old pupils at practical elementary schools in Prague in relationship to their degree of intellectual disability.

METHODS: Seven tests of coordination skills (rhythmical, balance, kinaesthetic differential, alteration, and associative) were used to assess the level of coordination skills in these children.

RESULTS: Substantive significant differences (using Cohen's *d* index) were proven, with an almost absolute definiteness, between pupils having their intellectual abilities in the lower boundary area of mild intellectual disability, and those whose intellectual abilities are in the upper boundary area of mild intellectual disability, and further between these and the others (profound intellectual substandard, mild intellectual substandard, average intellectual abilities – lower average). From the point of view of the average values of performance parameters, a direct relationship with the degree of intellectual disability can be observed – the former decreases as the latter increases. However, the best test score was surprisingly achieved by pupils with a slightly below average intellect and not by pupils with the highest level of intellectual abilities.

CONCLUSIONS: Different results of practical elementary school pupils' motor tests are causally dependent not only on the level of intellectual disability, but on its aetiology, too. They are also influenced by particular characteristics of pupils' personalities (including motivation) and by the environment they live in.

Keywords: Intellectual abilities, special schools, mental retardation.

INTRODUCTION

One of the most demanding categories of children in the field of special needs education has always been children with intellectual disability (ID), who have often been systematically overlooked in areas of care owing to their specificity. On a world scale, the incidence of individuals with ID is estimated at 2–3% of the total population. The biggest proportion of this category (approx. 80–90%) consists of children with mild ID (IQ 69–50), who, as a rule, spend their legally required school years in practical elementary schools (special schools) (Kysučan, 1990; Gaži, 1991; Krejčířová, 1995; Langer, 1996; Valenta & Krejčířová, 1997; Švarcová, 2000; Müller, 2001; Teplá, 2003; Valenta & Müller, 2007; Černá et al., 2008).

Although these institutions are primarily designed to educate children with this degree of intellectual disability, in recent years in particular we have encountered pupils here whose reasoning abilities fall into the intellectual below average band, or possibly even intellectual average, who, for some reason, did not make progress at ordinary elementary schools. At these schools there may be individuals with mental and emotional disorders, with specific learning disabilities, minimal brain dysfunctions, autistic features, mutism, behavioural difficulties, and sometimes a multihandicap (epilepsy, sensory impairment, endocrinological disorders, speech disorders, motor or somatic disorders et al.) (Plášková, 1991; Řáda, 1993; Pavličková, 2000); a considerable number come from an unstimulating socio-cultural environment (especially Romanies) (Balvín et al., 1997). Children come to these schools from different environments – directly from the family, from a special kindergarten, from an ordinary kindergarten, or from an elementary school. There are almost 20% more boys than girls in these schools (Semerádová, 2001; Šmídová, Janoušková, & Katrňák, 2008).

In view of the considerable heterogeneity of pupils in terms of their mental development, age and sex, motor abilities, emotional factors, motivation, concomitant defects, socio-cultural background, etc., teaching physical education to one class can be highly demanding for a special needs teacher (Karásková, 1994). We therefore regard it as essential in the teaching process to make allowances for an internal differentiation process that would lead to a more effective management of the teaching unit and would also enable individualisation according to pupils' special needs and capabilities. Besides the aetiology of intellectual disability, we see the fundamental criterion in the degree of intellectual disability, on the basis of which pupils would be split into relatively homogeneous groups with approximately the same motor competence, which would make it possible for the vast majority of them to achieve the set goals of the physical education programme.

Up to now, children with mild ID, or pupils of practical elementary schools, have not received as much attention in the area of motorics as they deserve. The research done to date has concentrated mainly on testing physical capacity or fitness, partly for the prevention of health risks associated with this population group's predominantly hypokinetic way of life. It has focused rather on comparing selected motor indicators of children with mild ID and their intact peers. Comparing the motor performance of individual categories of persons with ID in relationship to their degree of disability is not such a frequent subject of study; more research of this type has been conducted among the adult or adolescent population (Černá, 1985; Válková & Thaiszová, 1989; De Franca Barros & Leite de Barros Neto, 1999). One pioneering study is the work of Londeree and Johnson (1974), who compared the standard of motor performance of individuals with average intelligence, mild ID, moderate and severe ID aged 6–19. More recently, Eichstaedt et al. (1991, in Eichstaedt & Lavay, 1992), conducted an extensive study of 4,464 mentally retarded boys and girls aged 6–20 to ascertain the differences in the level of motor performance between groups with mild ID, moderate ID, Down syndrome and the intact population.

Pires Lopes and Bentes dos Santos (2002) studied differences in the motor skills of boys and girls aged 10–14 in correlation with the degree of ID (mild ID, moderate ID, severe ID). In research done with 207 children with mild to severe ID aged 6–15, Kusano and Gohara (1990) compared their standard of motor coordination, measured by the softest and quietest landing of the test subjects from a height of 40 centimetres onto a measuring board.

Coordination abilities account for just a very small part of scientific interest and have been researched much less than fitness – this is probably because they are complex and less clearly defined, and also because it is harder to find valid indicators for them. In addition, with children with mild ID (practical elementary school pupils) we regard the development of coordination skills as more difficult. We believe, however, that the priority standing of coordination skills in the structure and development of the motor skills of these schoolchildren makes it necessary to identify the standard of these skills and the change dynamics in individual stages of ontogenesis. Contemporary civilisation increasingly needs individuals whose excellence enables them to keep pace with the perfection of technology and, seeing that the future work process of those leaving these schools focuses mainly on manual work, a good standard of coordination skills is a precondition of their successfully finding work.

There are not even any guideline data of this nature in the Czech Republic and the relationship between the degree of intellectual disability and coordination abilities is a very rarely studied issue. The goal of this study was therefore to identify the level of selected coordination abilities of practical elementary school pupils aged 9–11 years in relationship to their degree of intellectual disability.

METHOD

Participants

The research sample consisted of 153 practical elementary school pupils (61 girls and 92 boys) aged 9–11 years (10.62 ± 0.56 years). This involved an exhaustive survey (it concerns a convenience sample) at those schools that offered suitable conditions for the conducting of the research (a total of 17 out of a basic set of 24). An attempt was made to contact the school principals and parents or primary caregivers of these children to explain the project and request consent.

Based on the data acquired from the content analysis of pedagogical-psychological documentation, pupils were divided into five groups[1] according to the quantitative standard of their intellectual abilities:

- ***Group A:*** lower boundary of mild ID (IQ 50–59) – 11 pupils (54.5% girls and 45.5% boys).
- ***Group B:*** upper boundary of mild ID (IQ 60–69) – 31 pupils (35.5% girls and 64.5% boys).
- ***Group C:*** profound intellectual substandard (IQ 70–79) – 61 pupils (45.9% girls and 54.1% boys).
- ***Group D:*** mild intellectual substandard (IQ 80–89) – 36 pupils (38.9% girls and 61.1% boys).
- ***Group E:*** average intellectual abilities – lower average (IQ 90–100) – 14 pupils (14.3% girls and 85.7% boys).

Because the fundamental criterion for the research project's comparative objective was the standard of intellectual ability and not a comparison with a certain

[1] The given categories are merely an artificial division of a complex continuity and cannot be defined with absolute precision. The IQ values given in brackets are merely guideline.

norm, and because the groups were relatively balanced in terms of sex and age (with the exception of the uneven composition of Group E in terms of sex and Group D in terms of age), we do not consider viewing the groups as a whole, i.e. irrespective of medical history indicators, as too much of an error.

Instruments

During testing, a whole series of methodological problems are created by the basic characteristics of practical elementary schoolchildren/particularly children with mild ID. The motor tests must be at the optimal level of difficulty and must not take up too much time if they are to possess any validity, and their content, i.e. the individual tasks, must be absolutely clear and comprehensible to the children and must not arouse fear, e.g. of heights, fear of apparatus, etc. Moreover, selecting appropriate tests is highly fundamental owing to the need to make allowances for the aspect of the standard of motor skill that is required to perform a specific movement task.

The following tests (for their description see the Appendix) were used to assess the level of pupils' coordination skills (Měkota, 1979):

1. *Non rhythmic drumming* (test of rhythmic ability).
2. *Asynchronous and asymmetrical arm movements* (the criterion for coping with the movement task is the ability to adapt movement to altered conditions).
3. *One leg standing endurance test with eyes closed* (test of motor balance).
4. *Jump over a skipping rope* (the criterion for coping with the movement task is the complexity of movement).
5. *Routine with rod* (test of the ability to deal with spatial and temporal structure of movement in combination, i.e. a test of dexterity – the criterion for managing the movement task is speed of movement).
6. *Backward long jump* (test of the ability to deal with a combination of spatial movement structures, i.e. a test of dexterity – the criterion for managing the movement task is speed of movement).
7. *Jump onto a target* (test of kinaesthetic differential ability – the criterion for coping with the movement tasks is precision of movement).

Data collection

Before each motor test the children were given precise instructions and told the applicable rules. In view of their insufficient ability to concentrate and a lower standard of comprehension among practical elementary schoolchildren, often linked to problems in understanding oral instructions, it was necessary to aid their comprehension of a specific task with a visual demonstration by the examiner herself, sometimes in the form of imagery, in some cases by tactile assistance.

The testing took place in school classrooms and in gyms where physical education is taught at a particular school, i.e. in conditions the test subjects were very familiar with and used to. During the testing, the basic objective conditions were always complied with. The testing process was not significantly disrupted, e.g. by ambient noise, the presence of unauthorised persons, etc. The test subjects were sufficiently motivated by the examiner (the author of this paper) to perform the motor exercises and duly encouraged during testing – they were kept informed of the "record" scores in each test. That often generated a genuine atmosphere of striving for the best result, with the children encouraging each other. Overall, the testing took place in a positive atmosphere – the pupils were interested and involved and, for the most part, cooperated well with the examiner. No signs of boredom were registered, which can definitely be ascribed to the diverse range of motor tests and the novelty effect. The new, appropriately presented event, devoid of the monotony, tedium and lack of creativity that typify physical education classes at practical elementary schools, and the presence of a new person – the examiner – encouraged the children to be active.

Before the specific motor tests were performed, the children were always given sufficient time to familiarise themselves with them and in some cases practise them.

The examiner used all these measures to create the kind of environment that would reduce any anxiety the testing might have aroused in the test subjects and would thus, to some extent, enable them to render the best possible performance.

Because of the increased propensity to fatigue among practical elementary schoolchildren, there were breaks during the testing to allow the children to rest, go to the toilet or take refreshment.

Procedure

The following basic descriptive statistical parameters were used to assess the standard and consistency of performances in individual motor tests: arithmetic mean (M), median (Me), standard deviation (SD). The substantive significance of differences in average performances was assessed using Cohen's *d* index (effect size). This index operates with conventional values, which make it easier to determine when a difference is large, or the relative substantive significance of the difference in performance averages (Kromrey et al., 2007). When judging substantive significance, we worked on the sole basis of the mean of the scores of participants who had completed a given motor task.

RESULTS

A clearly proven substantively significant difference between group A and all other groups, with group A

TABLE 1
Assessment of substantive significance (effect size) of the difference in motor test results between individual groups of pupils differentiated according to the degree of intellectual ability

Groups	Substantive significance	Non rhythmic drumming	Asyn. arm movements	One leg standing balance	Jump over skip. rope	Routine with rod	Backward long jump	Jump onto a target
A–B	Difference	medium	small	small	medium	large	medium	small
	d	0.68	0.07	0.00	0.73	**0.91**	0.76	0.49
A–C	Difference	large	large	large	large	large	large	large
	d	**1.69**	**0.94**	**1.11**	**1.66**	**1.22**	**2.08**	**1.19**
A–D	Difference	large	large	large	large	large	large	large
	d	**2.39**	**1.15**	**1.28**	**2.37**	**1.18**	**3.16**	**0.94**
A–E	Difference	large	medium	large	large	large	large	large
	d	**2.34**	0.65	**0.88**	**1.44**	**1.37**	**2.07**	**1.98**
B–C	Difference	large	large	large	medium	small	large	small
	d	**1.06**	**0.84**	**1.06**	0.57	0.46	**1.02**	0.30
B–D	Difference	large	large	large	large	small	large	small
	d	**1.69**	**1.01**	**1.23**	**1.18**	0.49	**1.76**	0.26
B–E	Difference	large	medium	large	medium	medium	large	medium
	d	**1.67**	0.61	**0.85**	0.71	0.56	**1.24**	0.67
C–D	Difference	small	small	small	medium	small	medium	small
	d	0.49	0.30	0.40	0.66	0.08	0.68	0.01
C–E	Difference	medium	small	small	small	small	small	medium
	d	0.52	0.09	0.15	0.28	0.06	0.44	0.50
D–E	Difference	small	small	small	small	small	small	small
	d	0.05	0.31	0.16	0.27	0.04	0.05	0.36

achieving worse results, was found in the observed motor indicators (the exception is the result of the *asynchronous and asymmetric arm movements* test, where the substantive difference between groups A and B is very small). The same tendency is evident when the scores of group B are compared with the others; only the difference in scores in the *jump onto a target* test between groups B and E is not so significant (TABLE 1). By contrast, the scores achieved by groups C and D, C and E, and D and E were not significantly different, with the exception of the results of the *jump over a skipping rope* and *backward long jump* tests when comparing groups C and D and in the *non rhythmic drumming* and *jump onto a target* tests when comparing groups C and E.

In summary, the best results in the selected coordination skills tests were achieved by group D, whereas group A displayed the lowest standard of motor performance. TABLE 2 gives a detailed overview of the each group's scores.

From the point of view of the consistency of performance on individual motor tests, the most homogeneous group is group A, while group E is characterised by a large inter-individual dispersion. It is worth mentioning the value of the standard deviation with the performances of all groups in the *jump over a skipping rope* test, which is greater than the value of the arithmetic mean – this is proof of the asymmetry of the distribution of test scores, whereby the most successfully pupils (who managed five jumps) deviate very significantly from the mean.

Overall, one can observe a certain relationship between intellect and the motorics of practical elementary school pupils – as intellectual level decreases, so does the standard of motor performance (TABLE 2). However, group E's results were unexpected – in all motor indicators under scrutiny (with the exception of performance in the *non rhythmic drumming* and *jump onto a target* tests) this group demonstrated a lower performance relative to group D (in terms of the arithmetic mean of scores), and in the *asynchronous and asymmetric arm movements* test this even applies relative to group C. This circumstance can be explained by, among other things, the small size of group E and the large inter-individual dispersion of scores of individual participants and also by the fact that the selected scale of intellectual ability ratings is too fine and the transition between categories is very fluid. Another factor may be that these pupils were placed in the special needs schooling system for non intellectual reasons, such as a lack of motivation or even demotivation vis-à-vis school and school duties, health differences, anxiety, neuroticism, and so forth, which may have been reflected in their approach to the testing.

TABLE 2
Basic statistical characteristics of scores in motor tests for individual groups of pupils, differentiated according to the degree of intellectual ability

Motor test		Non rhythmic drumming	Asyn. arm movements	One leg standing balance	Jump over skip. rope	Routine with rod	Backward long jump	Jump onto a target
Group A	n	11	6	11	11	8	11	11
	M	1.59	95.83	7.55	0	41.97	24.36	33.05
	SD	1.27	44.45	5.77	0	12.28	8.58	10.92
	Me	1.75	82	8	0	37.2	25	33
Group B	n	31	25	31	31	23	31	31
	M	2.50	99.52	7.55	0.42	32.21	33.32	25.48
	SD	1.39	63.40	6.44	1.15	9.18	15.08	23.41
	Me	2.25	88#	6#	0#	31	36	17#
Group C	n	61	58	61	61	57	61	61
	M	4.19	59.10	15.30	1.13	27.5	48.44	19.18
	SD	1.81	33.29	8.21	1.36	11.46	14.57	12.39
	Me	4.25	54#	13#	1#	25.78#	48	19.5#
Group D	n	36	35	36	36	36	36	36
	M	5.03	48.26	19.49	2.19	26.49	57.61	19.01
	SD	1.61	38.24	12.94	1.85	13.95	12.48	18.94
	Me	5	38#	15#	2#	23.71#	57	14#
Group E	n	14	14	14	14	14	14	14
	M	5.11	63.14	17.18	1.64	26.91	56.71	14.25
	SD	1.74	56.32	16.09	2.27	9.63	22.7	7.35
	Me	5	42.5#	11.5#	0	24.9	52.5#	14.25

Legend:
– abnormal distribution of data
n – number of pupils who successfully perform the test
M – mean
SD – standard deviation
Me – median
1 M, SD, Me are given in number of cycles
2 M, SD, Me are given in seconds
3 M, SD, Me are given in the numbers of performances
4 M, SD, Me are given in centimetres

DISCUSSION

Unfortunately, we cannot compare this data with any available research scrutinising the same age category, with a similar structure of intellectual disability and using at least similar diagnostic tools to assess motor abilities. We can draw some guidance from the pioneering work of Londeree and Johnson (1974), whose comparison of the level of the physical capability of 6–19 year old individuals with average intelligence, mild ID and moderate to profound ID confirmed that performance in motor tests falls with a rising degree of intellectual disability. The same conclusions were reached by Eichstaedt et al. (1991, in Eichstaedt & Lavay, 1992) in an extensive survey of 4,464 mentally retarded individuals aged 6–20.

The selected motor tests proved to be suitable tools for measuring the standard of motor performance among pupils of practical elementary schools and can be used in this form in other field studies as well. The choice of diagnostic tools must always respect the fact that the difficulty of the movement task must generally be such that even the "weakest" test subject can complete the task and at the same time it presents a challenge even for the most proficient test subject (Měkota & Novosad, 2005); that is almost impossible with a group as heterogeneous as the pupils of practical elementary schools, however.

In the following part of the discussion we look more closely at pupils' difficulties in performing certain tests and the factors that could affect their performances.

The ability to perform the rhythmic routine in the *non rhythmic drumming*, i.e. the accuracy and speed at which a new, rhythmically demanding movement structure could be managed, was very high in certain pupils (mainly from group E) – they assimilated the routine quickly and were able to reproduce it without error and rapidly. In contrast, other schoolchildren (mainly from groups A and B) had considerable difficulties remembering the movement structure and would, for example, leave out part of the routine or proceed very slowly, etc.

Reconstruction ability, which was rated by the *asynchronous and asymmetric arm movements* test, lies to a great extent in the speed and accuracy of perception and also in the ability to anticipate change. In this case, the test subjects' experience plays a big role (Měkota & Novosad, 2005) – the population under scrutiny has less experience in this regard. Of the schoolchildren, 10% completely failed to master the movement task. The complexity of this exercise, consisting in adapting or reconstructing movements according to changing conditions (instructions), was highly demanding for the test subjects. The change concerned the shift in the timing of individual movements. Internal conditions also changed during the activity as a result of the increased fatigue of the majority of children (especially in groups A and B). Bauer, Pellens and Van der Schoot (1981) emphasise that the test subjects' previous experiences and the degree of complexity of the task play a major role in performance in balance skills tests (in this research project this was the *one leg standing endurance with eyes closed* test) – the differences in performance between children with mild ID and intact children are not so marked in tests with a lower degree of complexity as in tests with a high degree of complexity. When seeking to ascertain the standard of static balance ability, which Tóth, Sipos and Bognár (2004) regard as one of the most important signs of psychomotoric development, we observed that the children had very considerable difficulties holding a fixed body position for even a few seconds. The elimination of visual control made the task enormously more difficult again; they were unable to change the tonus of their muscle groups or make subtle compensatory movements of various parts of the body to make rapid corrections to even minor variations in the given position. Kiphard (1990) associates these insufficient correction movements when maintaining balance with a general lack of delicate motoric control.

The assessment of balance abilities is almost the only one of the set of coordination skills that has received significant attention in research studies looking at children with mild ID. In research by Brandt et al. (1997), pupils at special schools achieved roughly half the standard of performance of intact children in a static balance test – to some extent this tallies with the results of this research. Kokobun and Koike (1995) studied the performance of children and adults with ID (from mild to severe) in dynamic balance (walking along a balance beam) and in static balance (standing on one leg with eyes open), correlated to the influence of four factors: chronological age, mental age, clinical type, and the age when the person started walking. Overall, these abilities develop with increasing chronological and also mental age – mental age is a stronger factor in static balance than dynamic balance. Children who started to walk at a younger age attain higher scores in balance tests than those who started to walk at a later age. The authors add that the belated development of motor reflexes may be one of the reasons for the poor standard of balance skills in individuals with ID.

On the other hand, Eichstaedt and Lavay (1992) regard the low standard of strength of the legs as one of the potential causes of poor performance in standing on the non dominant leg.

As expected, *jump over a skipping rope* caused most of the children particularly serious difficulties; the highest failure rate of all the selected tests was recorded here – a full 55% of the sample scored zero, and a large number of these were not able to spring with their legs together or land with their legs together. Besides whole body coordination and explosive power in the legs, courage also played a certain part in performance in this test, especially among children with anxiety problems and with low aspirations and diminished self confidence.

Besides dexterity, motoric memory also influences performance in the *routine with rod* test; the individual parts of the routine were less customary for the children and thus placed greater demands on their cognitive functions. We observed a considerable increase in the effect of sensomotoric learning, which was reflected in a relatively big difference in achieved times between the 1st and 3rd attempts, and in some cases the 1st and 2nd attempts. In girls of younger school age, Kostadinovová (1992) found that the movement task represented by this test involved both the overall level of intelligence and the ability to focus attention. In our opinion, this movement task was the best received by the children. One reason was certainly that it was associated with a subjectively experienced feeling of success, manifested in an entirely obvious intra-individual improvement in performance with each new attempt, and with the piece of equipment, which, as the children's reactions indicated, are not used often in physical education lessons at practical elementary schools.

The kinaesthetic differential abilities tested by *jump onto a target* are used to control movements in time, space and dynamics that make it possible to achieve a high degree of accuracy and the delicate interplay of individual movement phases and overall movement. This complex activity functions via perception, as the basic precondition of this ability and differentiation as its creative application. The standard of both perception and differentiation falls with falling intelligence – we could observe this in the different test scores achieved by children differentiated by their degree of intellectual disability. A fundamental part of this task consists in motoric memory and the test subjects' movement experience, which is linked to the perception of the subtest differences in the performance of movement and its comparison with the previous attempt. Both factors are of a lower standard in the population under scrutiny than among the intact child population. Graunke and Schmidt (1983) also mention that pupils of special schools/children with mild ID tend to fail at movement tasks requiring fine dexterity in the sense of the measuring of exact impulses, the precise gauging of strength or direction and precision of movement.

Assessing the pupils' motor performance solely on the basis of the value of their performances in specific tests does not reveal the internal and external factors which the performance is dependent on and which, moreover, have different valences in different children as a consequence of their individual differences. The reasons for the identified standard of the motor performance of children in the individual groups are as multifarious as the reasons for their disability and are often partly identical to them. As there are usually several factors at work here, shortcomings in the children's motor abilities can only rarely be ascribed categorically to one specific reason.

These research results highlight the urgent need to devote adequate attention to the motorics of practical elementary schoolchildren. In particular, the motoric shortcomings identified in children with the most profound intellectual disability may be considered a barrier to their mobility training when instilling basic work and life habits, and consequently in social adaptation, or integration; there is no doubt, however, that they too have sufficient prerequisites for development of their motor abilities, within the context of their disability.

The emphasis in educational work should therefore be placed not only on practical activity and assimilation of the practical skills necessary for involving these children in the ordinary life of society, on manual dexterity and work habits; emphasis should also be placed on the overall development of motorics in physical education. As a final point, we would like to point out that children's motor abilities are not the only precondition of movement activity in an occupation or sport; success in these areas is also conditional on prerequisites such as constitution, personality qualities and performance motivation.

CONCLUSIONS

Practical elementary school pupils differ in the level of coordination skills with respect to their intellectual disability level. Significant differences were proved, with an almost absolute definiteness, between pupils having their intellectual abilities in the lower boundary area of mild ID (group A), and the others except those, whose intellectual abilities are in the upper boundary area of mild ID (group B), and further between group B and the others. As concerns motor result average values, a direct interrelation with the intellectual disability level can be observed – they drop with its increase. The best test scores (save rhythmical and kinaesthetic differential abilities) were surprisingly registered in pupils with mild intellectual substandard, not in pupils with the highest intellectual ability level. This can be explained by their small sample; health problems, anxiety, neuroticism, or perhaps demotivation at school could have influenced the results in the negative way as well.

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ÚROVEŇ VYBRANÝCH KOORDINAČNÍCH SCHOPNOSTÍ 9–11LETÝCH ŽÁKŮ ZÁKLADNÍCH ŠKOL PRAKTICKÝCH V ZÁVISLOSTI NA STUPNI JEJICH MENTÁLNÍHO POSTIŽENÍ

(Souhrn anglického textu)

VÝCHODISKA: Za jedno z hlavních kritérií nezbytné vnitřní diferenciace tělovýchovného procesu na základních školách praktických je považován stupeň mentálního postižení žáků. Doposud však dětem s mentálním postižením, resp. žákům základních škol praktických nebyl v tomto ohledu věnován dostatek pozornosti jak v oblasti výzkumného bádání, tak v tělovýchovné praxi.

CÍLE: Cílem realizované studie bylo zjistit úroveň vybraných koordinačních schopností 153 žáků (ve věku 9–11 let) na základních školách praktických v Praze s ohledem na stupeň jejich mentálního postižení.

METODIKA: K posouzení úrovně vybraných koordinačních schopností bylo použito sedm motorických testů (rytmické, rovnováhové, kinesteticko-diferenciační schopnosti, schopnosti přestavby a sdružování).

VÝSLEDKY: Téměř naprosto jednoznačně byly věcně významné rozdíly (užitím Cohenova koeficientu *d*) prokázány mezi žáky s intelektovými schopnostmi v oblasti dolní hranice lehkého mentálního postižení a ostatními s výjimkou těch, jejichž intelektové schopnosti se pohybují na horní hranici lehkého mentálního postižení, a dále mezi těmito žáky a ostatními (hluboký intelektový podprůměr, lehký intelektový podprůměr, průměrné intelektové schopnosti – nižší průměr). Z hlediska průměrných hodnot motorických výkonů lze sledovat jejich přímou vazbu k míře mentálního postižení – klesají s jejím růstem. Nejlepší testová skóre byla překvapivě zaregistrována u žáků s lehkým intelektovým podprůměrem, a nikoliv u žáků s nejvyšší úrovní intelektových schopností.

ZÁVĚRY: Rozdílné výsledky v motorických testech žáků základních škol praktických nejsou ryze kauzálně závislé pouze na stupni mentálního postižení, ale i na jeho etiologii. Rovněž je ovlivňují i specifika osobnosti žáků (včetně schopnosti motivace) a podmínky prostředí, v němž se pohybují.

Klíčová slova: intelektové schopnosti, speciální školy, mentální retardace.

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APPENDIX

Non rhythmic drumming

The test subject sits on a chair at a table and lays the palms of his hands on the table roughly shoulder width apart. When given the command, he "drums" with the palms of his hands as follows – 1. he strikes the table surface twice with his left palm; 2. he crosses his right hand over his left and again strikes the table twice with his right palm; 3. he touches his forehead once with his right palm; 4. he lowers his hand and touches the table with his right palm. The test subject repeats the cycle of movements for a period of 20 seconds. The number of complete and correctly performed cycles during the specified period is recorded. The test is repeated four times. The arithmetical average of all four attempts is used as the result.

Asynchronous and asymmetrical arm movements

From the initial position of standing up straight with legs together and arms at his sides the test subject performs a three count movement, initially five times – 1. stretch arms forward, 2. stretch arms sideways, 3. lower arms. The test subject then does the same again, with the difference that the left arm starts and performs the movement one count later. The time in seconds required to perform the routine three times without error is scored.

One-leg standing endurance test with eyes closed

The test subject stands fully on the sole of his dominant leg (without footwear); he bends the non dominant leg at the hip and knee, turns it outwards and rests the sole on the inside of the knee of his standing leg; he puts his hands on his hips and gives the timekeeper the command to start the stopwatch. The task is to keep his balance as long as possible, at most 60 seconds. The test is repeated three times. The score is the sum of the times.

Jump over a skipping rope

The test subjects stands on the ground holding the rope down in front of him so that the distance between the hands is 40 cm. By springing with legs together he jumps over the rope, landing on both feet in a stable position. He repeats the jump five times, always forwards. The number of perfect jumps is recorded.

Routine with rod

Basic position – standing with legs slightly apart, the test subject holds a short gymnasts' rod horizontally behind his legs (holding the rod at the edges). At the command, the test subject steps or jumps over the rod so that the pole is held flat in front of his legs. The test subject then turns 360° the way to the left (or right), sits down and then lies on his back, passing both legs simultaneously over the rod, stands up and straightens his body. (The rod is now again held flat and low behind him.) The test subject again moves the rod in front of his body by stepping or jumping over it, straightens up and stretches his arms forward. The total time in seconds that the test subject requires to perform the prescribed routine with the rod is measured. The test is repeated five times. The sum of the times of the second and third attempt are recorded. The first attempt is treated as practice.

Backward long jump

With knees bent and slightly apart, heels on the start line feet in parallel and approximately shoulder width apart, the test subject springs backwards, with his legs together, as far as he can, landing again with his legs together. Preparatory movements of the arms and torso are permitted, but preparatory bouncing is not. Five attempts are performed. The length of the jump in centimetres is assessed (from the line to the front edge of the sole of the foot that is closer to the line upon landing). The best attempt is recorded. Accuracy of measuring 1 cm.

Jump onto a target

Two parallel lines at the prescribed distance apart (approx. 50% of the test subject's height) are marked out on the floor. The test subject's task is to perform a long jump with legs together from the starting line to the target line so that upon landing the edges of both heels are exactly on the target line. After 2 jumps with eyes open, 2 jumps are performed with eyes closed. The absolute deviation from the target line are measured to an accuracy of 0.5 cm and recorded. The results of each pair of jumps are totalled.