Testing Motor Predispositions and Competences of Primary School Children in the Czech and Slovak Republics

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Abstract The aim of this study was to monitor the level of basic movement competences of children at the onset of school attendance, and to compare the results of fitness tests with the ones of genetic analysis for the purpose of sport talent identification. The research sample included 449 pupils attending elementary schools in the regions of Nitra, Slovakia, and Prague, Czech Republic. During the first phase, 271 pupils (152 males, mean age = 7.438; 119 females; mean age = 7.227) underwent 9 fitness tests to determine general physical abilities. Subsequently, 30 best scoring pupils were selected for genetic tests. The results in fitness tests do not match the ones obtained from the genetic analysis. During the second phase of the project, 178 pupils (93 males, 85 females) aged 7.31 years (SD±0.93 years) participated, out of whom 109 were Slovak and 69 Czech pupils. The level of performance of the Czech sample in object control tests is significantly higher than the one of the Slovak sample. Gender differences in object control tests were found in favor of boys.

Keywords: basic movement competences, fitness tests, gender differences, genetic analysis, 7-year-old pupils, sports talent identification.

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Introduction

Fundamental movement skills at an early age of children

Gross motor development is an area often overlooked by early childhood educators, including those in special education. During the pre-school and elementary years, a child's motor ability begins to mature. Physical growth and a child's history of movement experiences play a fundamental role in influencing shifts in movement patterns. If deficits in gross motor development are not identified and remediated, the child may experience lifelong problems with motor skills (Scheuer et al., 2017). Typical development is marked by well-observed patterns of motor behaviors, including reflexes, voluntary movements, and goal-directed actions. As a child progresses from infancy through early childhood, parents, teachers and clinicians serve the important role of identifying children with motor deficiencies. Parents and teachers can identify a child with a potential motor impairment. They may also aid clinicians and researchers in assessing and monitoring motor competence as part of a research study or investigation progress (Bardid et al., 2018). Therefore, the evaluation of gross motor development should represent an important aspect of early childhood screening programs.

Early childhood is a critical period for the development of fundamental movement skills (Hardy et al., 2010). The acquisition of fundamental movement skills is developmentally sequenced (Branta et al., 1984) and is contingent upon multiple internal and external factors (biological, psychological, social, motivational, cognitive, etc.) and the process of acquisition occurring through a range of active play experiences and structured programs. These skills allow children to interact with and explore their environment (Gallahue & Ozhun, 2002). Children who do not master fundamental movement skills are more likely to experience failure in the motor domain and less likely to participate in sport and games during childhood and adolescence. Studies among primary-school aged children report low levels of fundamental movement skills mastery indicating the need to implement fundamental movement skills programs during the preschool years (Hardy et al., 2010).

Furthermore, research among school aged children (Barnett et al., 2008; Barnett et al., 2008; Patterson, 2001) shows that mastery of fundamental movement skills is correlated with higher levels of physical activity, and there is emerging evidence among preschoolers that fundamental movement skills (Fisher, 2005), and in particular locomotor skills are also positively associated with physical activity. Studies among primary-school aged children indicate low levels of fundamental movement skills mastery (Okely, 2004; van Beurden et al., 2002). Therefore, it appears prudent to examine fundamental movement skills already in preschool and early-school aged children.

Testing motor competences

Testing motor predispositions and competences in physical education has gained in relevance over the last decades. In primary schools the aim of testing is to identify students with motor deficiencies and/or to assess motor proficiency levels in general.

The term *motor competence* relates to the development and performance of human movement (Stodden et al., 2008). Motor competence has encompassed a wide variety of terms such as fundamental motor skill or movement, motor proficiency or performance, motor ability and motor coordination (Robinson et al., 2015). Motor competence can also be explained as a person's ability to carry out different motor acts, including coordination of both fine (for example, manual dexterity) and gross (for example, static and dynamic balance) motor skills (Henderson & Sugden, 1992).

Numerous current research studies reported positive associations between motor competence and physical activity (Holfelder & Schott, 2014; Lubans et al., 2010), and motor competence and health related fitness (Haga, 2008; Stodden et al., 2014). The results of the recently published study by Luz et al. (2017) showed that motor competence has an influential role in the development of health-related fitness during childhood. Working with children to develop motor competence from an early age will trigger the achievement of better health related fitness, probably through the involvement of children in physical activities, sports and free play activities. Since childhood is a critical period for the acquisition of motor competence and health related fitness, it should be fundamental to promote both motor competence and health related fitness to benefit a healthy development of children.

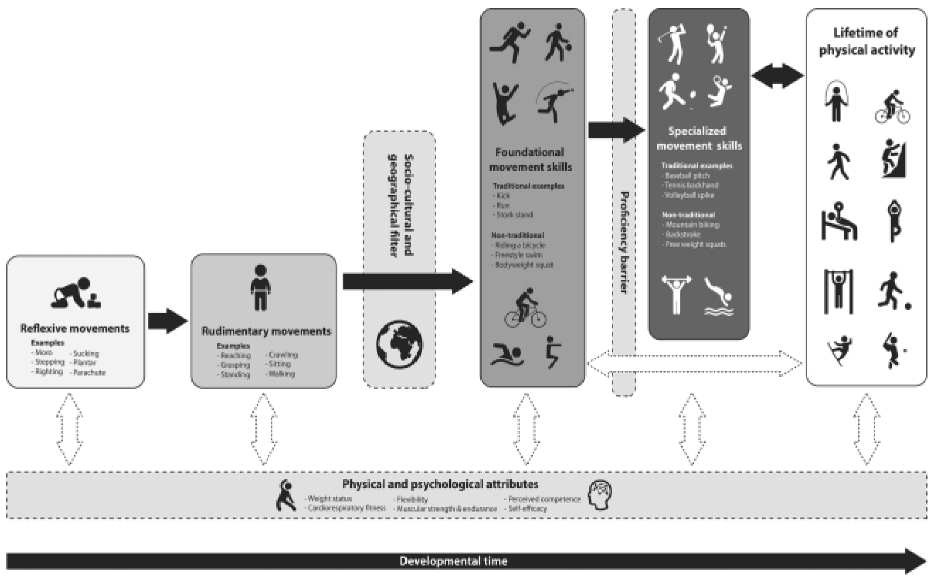
Basic motor competences (BMC) are motor performance predispositions expressed as minimum standards empowering children to participate in the movement culture. Or, they can alternatively be defined as a prerequisite for active participation in the culture of movement, play, and sports (Scheuer et al., 2017). They ensure that children and adolescents can participate in the education-related processes of this culture (Gogoll, 2012; Herrmann et al., 2015). BMC express a level of minimal requirements in the form of minimum standards. They determine the lower limit of the ability to move. One should not confuse BMC with motor abilities and sport motor skills. Unlike motor abilities, motor qualifications are always complex and context-bound. Furthermore, they are also more general than specific skills and form a foundation upon which skills and thus further development of competence are built (Scheuer et al., 2017).

The promotion of basic motor competences is a main goal of physical education lessons, since they are essential prerequisites to be able to develop a physically active lifestyle (Hulteen et al., 2018). There exist several different test batteries to assess basic motor competences of children and adolescents, however, there is not yet a consensus on which constructs comprise motor competence. The choice of test battery depends on different factors, such as the suitability of the test for the age group, the purpose of the measurement and the facilities/environment where the assessment takes place (Bardid et al., 2018). The most recently used batteries include: MOBAK and TGMD batteries. The former identifies three different areas of motor competence: locomotion, object-control, and moving in water, while the latter includes only two areas: locomotion, and object-control. The test of gross motor development – second edition (TGMD-2) was developed to meet the need for a well-constructed, standardized test. Gross motor development frequently includes movement behaviors that are used to transport the body from one location to another and to project and receive objects, especially balls. Hence, locomotion and object control behaviors form the nucleus of the general domain are measured by TGMD-2. In particular, the TGMD-2 measures how children coordinate their trunk and limbs during a movement task performance rather than assessing the end result (such as how fast they ran, how far they threw the ball). Clark (1994) described multiple, sequential periods, during which qualitative differences are observed in a child's motor behavior (Table 1). He added that individuals move through various periods at different rates, based on the confluence of multiple internal (biological, psychological, motivational, cognitive, social, and so forth) and external factors (the environment).

Table 1 Sequential periods reflecting qualitative differences in motor behaviors (Clark, 1994)

Time interval	Stage	Major periods
Neonatal (first 2–3 months)	1	Reflexive and spontaneous movements
First 12–14 months	2	Preadapted behavior repertoire
Preschool and early elementary years	3	Fundamental gross motor behaviors
Middle elementary through adulthood	4	Sport- and context-specific movements

In the last decade, an increase in sedentary behavior during occupational and domestic activities and insufficient participation in physical activity during leisure time have been reported in many research articles (Epstein, 2001; Troiano, 2008). Developing motor skill competence may be fundamental in developing and maintaining adequate physical fitness into adulthood (Stodden et al., 2009). 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 (Lubans et al., 2010). 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 (Hulteen et al., 2018; Loprinzi et al., 2015; Luz et al., 2017; Stodden et al., 2009). Failure to develop competency in fundamental movement skills will make learning more advanced/specialized forms of these skills more difficult. The importance of the fundamental movement skills phase is denoted as a time crucial for creating a broad base of skill competences thus promoting the greatest potential for skill transfer to other complexed skills. Along with learning more advanced skills, the levels of competency needed are higher due to the demands of specific activities (Langendorfer et al., 2011). In this context, discussion is on the way concerning which skills should be taught to children and adolescents in different developmental periods. A partial answer to this topical question is given by Hulteen et al. (2018) who proposed a conceptual model of the development of movement skills from reflexive movements to specialized movement skills (Figure 1). In this model, reflexive and rudimentary goal-oriented movements provide the basis for further development of more complex movement skills. Later on, fundamental movement skills emerge. However, they do not include the full range of skills that may allow children to participate in physical activities and sports throughout their lifespan. In context of this, Hulteen et al. (2018) suggested a new term 'foundational movement skills' which better reflects the wide variety of skills in which an individual should develop competency. Foundational movement skills are thus defined as goal-directed movement patterns that directly and indirectly impact an individual's capability to be physically active and can be developed to enhance physical activity participation and promote health throughout life.



Explanations: Black arrows indicate previously hypothesized pathways; white arrows and dotted boxes indicate newly hypothesized pathways/components unique to this conceptual model

Figure 1 Model of the development of foundational movement skills for physical activity across the lifespan
(Hulteen et al., 2018)

Sport talent identification through detecting motor competences

Detecting motor competences in children can also facilitate identification of sport talented individuals already in the first years of their school attendance. The talent identification process usually involves a physical (anthropometry) and physiological (performance measures: speed, strength, aerobic and anaerobic power) testing battery relevant to the demands of the sport. However, a one-dimensional approach in talent identification based on physical and physiological parameters can be misleading. Rather, a multidisciplinary approach addressing physical, physiological, technical, sociological and psychological predictors should be conducted (Meylan et al, 2010).

Sport talent identification through genetic testing

Fitness tests formerly used for talent identification at an early age cannot properly find the future talent because the tests results depend on the specific point in time of testing with respect to the athlete's optimal training level, daily physical state and health (Burgess & Naughton, 2010). If an athlete is not able to show his or her best performance in the test situation, the results do not reflect his or her "real abilities". Therefore, an alternative approach of talent development instead of the conventional "snap-shot" testing has been proposed. Genetic testing has become a new method of disclosing the background of sports talents (Bouchard et al., 2011). At present, research projects are aimed at integrated measurements of the effect of various genes and environmental effects on one's genotype. Genetic tests differ in principle from the traditional motor tests, because DNA of an individual does not change during their early childhood. Genetics play an important role in determining the capacity of an individual to go in for sports at the top professional level. The question is which genetic elements influence motor abilities and what is their respective significance. Furthermore, it is necessary to know the related genes as well as the mechanisms and metabolic paths and their influence. Sports performance is not determined only by a single gene but concurrent interactions of several genes (Sessa et al., 2011). Genetic tests can inform trainers and athletes on the type of physical activity (endurance or speed) suitable for the given individual. The results of fitness tests can provide them only with partial information on the momentary state of fitness of children. However, such information can be fruitful for them when developing individual training programs and in discovering talented children. The sole use of genetic analysis can offer only hereditary characteristic of an individual, which, however, need not be developed during the life of the person.

The aim of the article was to monitor the level of basic motor competences of children at the onset of their school attendance. Attention was also paid to the comparison of the results of fitness tests with the ones of genetic analysis for the purpose of sport talent identification.

Method

The research procedure consisted of three different protocols: Fitness Testing (1), Gross Motor Development Testing (2), and Genetic Analysis (3).

First phase – fitness testing

The research sample included 271 children (152 males and 119 females) aged 6–8 years (mean age = 7.36 years) attending the first grade at 3 elementary schools in Nitra, Slovakia. Basic characteristics of the sample are presented in table 2.

Table 2: Basic characteristics of the sample

Slovak sample (SK) (*n* = 271)	Decimal age	Body Height	Body Mass	Body mass index
Boys (*n* = 152)	7.39	126.91	26.75	16.52
Girls (*n* = 119)	7.34	125.34	25.24	15.98

Fitness testing for sport talent identification included 8 items: Coordination test with a stick, Arm hang, Standing Broad Jump, 4x10m Shuttle Run, 30s Sit-ups, Sit-and Reach test, Rolling of 3 Balls, 20m Beep Test. Somatic measurements included body height, body mass, and BMI (Šimonek, 2018). The test results were assessed using the 7-point scale according to the procedure by Moravec et al. (2002). The total score of individual children was formed by adding the points from individual fitness tests. The 30 best children who scored highest points (out of the total 271 children) were recommended for genetic testing.

Second phase – gross motor development testing

The research sample consisted of 178 children (93 male; 85 female) aged 7.31 years (*SD*±0.93 years), out of whom 109 were Slovak and 69 Czech pupils. Characteristics of the samples are presented in tables 3 and 4. In the second phase of the project, locomotion and fundamental skills of children were tested.

Table 3: Characteristics of the sample of Czech pupils (n = 69)

Czech sample (CZ) (*n* = 69)	Decimal age	Body Height	Body Mass	Body mass index
Boys (*n* = 34)	7.39	128.6	27.6	16.6
Girls (*n* = 35)	7.33	126.2	25.2	15.7

Table 4: Characteristics of the sample of Slovak pupils (n = 109)

Slovak sample (SK) (*n* = 109)	Decimal age	Body Height	Body Mass	Body mass index
Boys (*n* = 59)	7.27	126.1	27.3	16.8
Girls (*n* = 50)	7.24	123.3	25.5	15.9

Gross Motor Development Testing included two subtests (Locomotor and Object Control) that make up the TGMD-2 (Scheuer et al., 2017). By means of these two subtests the level of gross motor development of selected children was assessed. The Locomotor subtest measures the following gross motor skills that require fluid coordinated movements of the body as the child moves in one direction or another: Run, Gallop, Hop, Leap, Horizontal Jump, and Slide. The Object Control subtest measures the following gross motor skills that demonstrate efficient throwing, striking, and catching movements: Striking a Stationary Ball, Stationary Dribble, Catch, Kick, Overhead Throw, and Underhand Roll. Each gross motor skill included several behavioral components that were presented as performance criteria. In general, these behaviors represented a mature pattern of the skill. If the child performed a behavioral component correctly, the examiner marked a 1; if the child did not perform a behavioral component correctly, the examiner marked a 0. After completing this procedure for each of the two trials, the examiner totaled the scores of the two trials to obtain a raw skill score for each item (run, gallop, hop, etc.). The entire TGMD-2 lasted for approximately 15-20 minutes for one child.

Statistical procedure included arithmetic mean, standard deviation (Tables 5 and 6), and Man-Whitney U-test for independent samples (Tables 7 through 9). Cohen's *d* was used to indicate the standardized difference between two means.

<u>Third phase – genetic analysis</u>

The research sample consisted of 30 pupils with the highest number of points scored in fitness tests. The third protocol represented genetic analysis of samples of 2ml saliva (GeneFix Saliva Collectors). The samples were analyzed using the apparatus HiScan (Illumina Inc., San Diego, USA), which allowed for analyzing 400.000 polymorphisms in a human gene. The values of individual genetic scores were compared with a histogram of genetic score distribution in European population. Software Genomestudio (Illumina Inc., San Diego, USA) and software TANAGRA 1.4.50 were used for data analysis (Šimonek & Židek, 2019).

Instruments and analysis: Four separate panels of genetic markers were selected for analysis. An unweighted "genetic score" based on contribution to anaerobic capacity, sport motivation, muscle pain and body mass had been calculated. A score of "0" represented the homozygote for the low-response variant; "1" represented heterozygous and "2" represented homozygous for the high-response allele. In certain variants with significantly higher impact was the genetic score increase to "2" for heterozygous and "4" for homozygous high-response allele. Sum of genetic score calculated for each haplotype has been enriched by probability to observe a specific haplotype in the European (Caucasian) population. The overall population risk has been visualized as a histogram of given genetic score based on frequencies of all possible haplotypes in the European population. The calculated rate of the genetic score had been confronted with the histogram of genetic score distribution of 30 control individuals genotyped through Illumina chip HumanOmniExpress-24 (23andMe v3, v4, v5) and derived from the project NU3Gen.

Results

The results of measurements of both locomotion and object control skills in the Slovak sample are presented in Tables 5 and 6.

Table 5: Statistical data for the Slovak sample

LOCOMOTIONS							
Group/test	run	gallop	hop	leap	board jump	slide	TORAL
BOYS	6.73 ± 1.9	6.19 ± 2.31	8.42 ± 2.51	5.20 ± 1.27	6.63 ± 1.73	6.61 ± 1.82	39.78 ± 7.1
GIRLS	6.82 ± 1.52	6.24 ± 2.40	9.02 ± 1.56	5.14 ± 1.43	6.34 ± 2.02	6.54 ± 1.81	40.10 ± 6.33
OBJECT CONTROL							
Group/test	strike	dribble	catch	kick	throw	roll	TORAL
BOYS	3.22 ± 1.46	3.56 ± 2.51	3.68 ± 1.73	4.80 ± 1.71	3.05 ± 1.91	3.68 ± 1.86	21.98 ± 6.02
GIRLS	2.96 ± 1.06	2.14 ± 2.56	3.44 ± 1.70	3.58 ± 1.56	2.60 ± 1.43	3.00 ± 1.37	17.72 ± 5.21

Table 6: Statistical data for the Czech sample

LOCOMOTIONS							
Group/test	run	gallop	hop	leap	board jump	slide	TORAL
BOYS	7.12 ± 1.45	6.18 ± 1.76	8.18 ± 2.05	5.26 ± 1.13	6.77 ± 1.15	6.53 ± 1.38	40.03 ± 5.01
GIRLS	7.13 ± 1.20	6.08 ± 1.74	8.14 ± 1.99	4.94 ± 1.22	6.86 ± 0.95	6.57 ± 1.38	39.71 ± 4.99
OBJECT CONTROL							
Group/test	strike	dribble	catch	kick	throw	roll	TORAL
BOYS	6.27 ± 1.38	5.15 ± 2.13	4.38 ± 1.15	6.59 ± 1.59	5.71 ± 1.58	4.82 ± 1.48	32.91 ± 6.02
GIRLS	5.31 ± 1.70	4.14 ± 2.16	3.86 ± 1.27	4.09 ± 1.99	4.57 ± 1.64	4.03 ± 1.62	26.00 ± 4.78

When looking at gender differences within the Slovak sample, we can state that they showed higher values in girls in the leap, broad jump and slide tests, while boys scored higher values in the rest of locomotion tests and all object control tests (Table 7). When evaluating gender differences in elementary locomotion tests**,** no statistical significance ($p > .05$) was detected in any of the six tests. On the contrary, when looking at gender differences in overall test results of motor skills, statistically significant difference was observed ($p < .01 = .001$; $d = .719$). In particular tests, the following results were found: No statistical significance was found in the tests of Striking the ball ($p > .05 = .528$; $d = .199$), Ball catching ($p > .05 = .547$; $d = .109$), Ball throwing ($p > .05 = .206$; $d = .266$), and Ball rolling ($p > .05 = .107$; $d = .392$), while positive significance was proved in the tests of Dribbling ($p < .01 = .003$; $d = .538$), and Ball kicking ($p < .01 = .001$; $d = .703$). All significant differences were in favor of boys.

Table :7 Gender differences in locomotion and skills tests within the Slovak sample

Locomotion	P	Cohen's d		Skills	p	Cohen's d
run	.662	-0.02773		**strike**	.528	0.199
galop	.951	0.02482		**dribble**	.003**	0.538
hop	.619	-0.24392		**catch**	.547	0.109
leap	.979	0.08970		**kick**	< .001**	0.703
broad jump	.383	0.18249		**throw**	.206	0.266
slide	.788	0.00561		**roll**	.107	0.392
Total	.844	-0.00602		**Total**	< .001**	0.719

Legend: ** gender differences ($p \leq .01$). Effect size significance: 0.2 – 0.49 = small effect; 0.5 – 0.79 = medium effect; 0.8 < large effect.

Gender differences within the Czech sample showed higher values in girls in the run, broad jump and slide tests, while boys scored higher values in the rest of locomotion tests and all object control tests (Table 8). There was a very slight difference in total values of locomotion tests. When looking at gender differences in elementary locomotion tests**,** no statistical significance ($p > .05$) was detected in any of the six tests. On the contrary, when evaluating gender differences in overall test results of motor skills, statistically significant difference was observed ($p < .01 = .001$; $d = 1.239$).

Table 8 Gender differences in locomotion and skills tests within the Czech sample

Locomotion	P	Cohen's d		Skills	p	Cohen's d
run	.771	0.00246		**strike**	.020*	0.596
galop	.772	0.05035		**drible**	.095	0.455
hop	.896	0.01618		**catch**	.140	0.421
leap	.231	0.26544		**kick**	< .001**	1.348
broad jump	.940	-0.08545		**throw**	.007**	0.685
slide	.891	-0.02960		**roll**	.062	0.496
Total	.791	0.06127		**Total**	< .001**	1.239

Legend: * gender differences ($p \leq .05$), ** gender differences ($p \leq .01$); Effect size significance: 0.2 – 0.49 = small effect; 0.5 – 0.79 = medium effect; 0.8 < large effect.

In particular tests the following results were found: No statistical significance was found in the tests of Dribbling ($p > .05 = .095$; $d = .455$), Ball catching ($p > .05 = .140$; $d = .421$), and Ball rolling ($p > .05 = .062$; $d = .496$), while positive significance was proved in the tests of Striking the ball ($p < .05 = .020$; $d = .596$), Ball kicking ($p < .01 =.001$; $d = 1.348$), and Ball throwing ($p < .01 = .007$; $d = .685$), All significant differences were in favor of boys.

To compare the level of basic locomotion and fundamental object control skills between the Slovak and Czech samples comparative analysis was employed. Based on the small sample size a non-parametric Mann-Whitney U-test was used for finding the differences between the two samples. Logical relations were evaluated using the Cohen's *d* test. The results are depicted in Table 9.

No statistical differences, with the exception of the Hop test (p < .05 = .027; $d = .166$), were found in the level of the components of locomotion tests between the Slovak and Czech samples (Table 9). However, statistically significant differences in favor of the Czech sample were observed in object control tests as a whole ($p < .01$; .001; $d = 1.86$), at 5 % level of statistical significance in Ball catching ($p < .05 = .030$; $d = .349$), and at 1 % level of statistical significance in Striking the ball ($p < .01 = .001$; $d = 1.850$), Ball dribbling ($p < .01 = .001$; $d = .693$), Ball kicking ($p < .01$; .001; $d = .553$), Ball throwing ($p < .01 = .001$; $d = 1.320$), and Ball rolling ($p < .01 = .001$; $d = .629$).

Table 9: Differences between the Czech and Slovak samples in locomotion and object control tests

Locomotion	p	Cohen's d	Skills	p	Cohen's d
run	.131	-0.2677	**strike**	< .001**	-1.850
gallop	.292	-0.0140	**drible**	< .001**	-0.693
hop	.027*	0.1660	**catch**	.030*	-0.349
leap	.549	-0.0145	**kick**	< .001**	-0.553
broad jump	.931	-0.2481	**throw**	< .001**	-1.320
slide	.481	-0.0505	**roll**	< .001**	-0.629
Total	.357	-0.0243	**Total**	< .001**	1.86

Legend: * gender differences ($p \leq .05$); ** gender differences ($p \leq .01$); Effect size significance: 0.2 – 0.49 = small effect; 0.5 – 0.79 = medium effect; 0.8 < large effect.

The results obtained during the second phase of our research showed that, by implementing the obligatory testing of motor prerequisites of children in Slovakia, we obtained a significant sample which can help identifying and selecting young talents in sports. Based on the broad data basis, parents and coaches will have the better chance to identify a potential sport talent and select them for the particular sport activity both in the sport club or in recreational activity. Selecting the top 10 % of children according to the results of motor tests did not reflect the results of genetic testing since in all 7 different parameters of sport performance the results did not match the ones obtained through motor testing. Some children showed a good level of performance in strength tests but scored low in endurance and coordination tests. It was also found that despite the high level of performance of some children in physical tests, they, on the contrary, showed a high risk of muscle injury and a low level of trainability. These are obstacles to improving sports performance in these individuals. However, based on the analysis of genes and motor prerequisites we offered parents and coaches valid information about their children's prerequisites to a certain group of sports, particularly oxidative capacity, regeneration speed, injury prevention, anaerobic capacity, motivation for sports, muscle pain susceptibility, and type of energetic metabolism.

Discussion and Conclusion

The preschool environment plays an important role in fostering and developing children's fundamental movement skills. The current findings highlight the need for teachers to provide structured opportunities which facilitate children's development and confidence in performing basic skills, which may include providing gender separated games, equipment and spaces. Playing games that are fun, inclusive and skill-based will help prepare children to participate in a wide variety of physical activities with greater success and enjoyment. Investments in fundamental skills development programs during early childhood are important because they have the potential to enable children to participate successfully in games and sports during adolescence and adulthood, and once learned, the skills are retained for life.

The overall results of our research suggested that while the level of performance of both samples in basic locomotion is not significantly different, the level of performance of the Czech sample in object control tests is significantly higher than the one of the Slovak sample ($p < .01 \quad = .001$; $d = 1.86$). We hypothesize that one of the reasons for better performance of the Czech children in object control tests was the fact that elementary school teachers in the Czech sample devoted more time in the curriculum to object control skills exercises. Administrators from the Czech partner proved this presumption true. More than one half of the content of physical education lessons in Czech primary school classes is formed by coordination exercises, dribbling, passing, catching throwing, rolling, hitting, striking, and similar. Significant gender differences in favor of boys in object control tests in both countries could be attributed to more frequent involvement of boys in ball games during their free time. Similar results were obtained by Ré et al. (2017).

Another explanation can be found in physical and motor development of both genders. Boys and girls develop differently in a few ways, and researchers are always studying the genes, hormones, and brain chemistry that might explain some of these differences. Of course, an individual child's development may not fit neatly within gender lines. Between the big growth stages of infancy and adolescence, boys and girls grow in height and weight at about the same slow, but steady rate. There aren't notable differences between the sexes until late elementary school – that's when girls start to grow taller faster, although boys catch up and surpass them within a few years. Boys' gross motor skills (running, jumping, balancing) tend to develop slightly faster, while girls' fine motor skills (holding a pencil, writing) improve first (Ding, 2020). Researchers continue to study the developmental differences between boys and girls and what causes them, but it's important to remember that biology alone doesn't determine the kind of son or daughter people will have. Exposing the child to a wide range of activities and experiences is the best way to support a well-rounded, active child.

Based on the results of our measurements we can assume that the content of physical education lessons at the primary level of education can contribute to the acquisition of motor competence and health related fitness to a great degree. This period of life is the crucial one for the promoting of both motor competence and health related fitness to benefit a healthy development of children. Professionals responsible for delivering gross motor programs should have a valid and reliable assessment tool, such as TGMD-2, to document the effectiveness of their programs. Teachers should establish realistic expectations for the amount of progress children should make from the beginning to the end of the school year. Based on tests of basic locomotor and manipulative skills, P.E. teachers can suggest sport coaches talented individuals for the regular sport training. However, the main issue is determining which test battery should be used to detect the key competences of young talents. When we have a look at the up-to-date sources (such as Clark, Meylan et al, and others), we can state that since motor capabilities have their sensitive periods only later during adolescence, it is thus necessary to follow and observe the process of learning motor skills of children during their early life. The tempo of motor learning should be one of the main factors indicating the sport talent in an individual. When we consider this assumption to be valid, test batteries comprising locomotor and manipulative skills tests (such as MOBAK and TGMD) should be preferred. However, test results cannot determine the real talent development. Only long-lasting hard training work can bring the success in top sport.

In the future research, it is inevitable to pay attention to the potential tempo of development of abilities and skills. A comparison of pretest and posttest results will indicate whether the pupils made significant progress or not.

The research attempted also at comparing different methods of sport talent identification. Results of the genetic analysis and measurement of motor abilities of selected children aged 7–8 years suggest that genetic testing of young athletes offers a suitable method of identifying performance prerequisites just before their development. Genetic tests can inform trainers and athletes on the type of physical activity (endurance or speed) suitable for the given individual. The results of fitness tests can provide them only with partial information on the momentary state of fitness of children. We can recommend both ways of identifying sport talents. We assume that genetic testing of young athletes offers a suitable method of identifying performance prerequisites just before their development. However, such information can be fruitful for them when developing individual training programs and in discovering talented children. The sole use of genetic analysis can offer only hereditary characteristic of an individual, which, however, need not be developed during the life of the person. Genetic analysis may be considered to be a suitable and practical alternative for fitness-oriented testing of the population.

A limitation to this study is the use of only one single test battery of gross motor coordination as the measurement of motor competence. Furthermore, the application of tests only on a sample consisting of children aged 6–7 limits our conclusions on a certain age group. Therefore, future research should investigate cross-cultural differences (not only in two Central European countries) in fundamental movement skills of a larger age span in order to understand the issues of motor competence in a broader sense.

This study provides valuable information on comparison of motor competence levels in children of two countries using the TGMD-2 test battery. Present results show that there are only slight differences in basic locomotor movements between genders. However, significant differences in favor of boys were found in object control tests proving that boys show a higher level of manipulative skills, especially kicking and dribbling the ball. These results can be explained by the fact that boys play with balls in their free time. Girls prefer basic locomotion movements, sometimes accompanied by music.

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