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Reliability and validity of the Four Station Fundamental Motor Test (4-SFMT) for assessing motor competence in preschool children

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Abstract: The main aim of this study was to create a new test for assessing the motor competence of children of preschool and early school age and to determine its reliability and validity. Thirty children (5–6 years) were tested on two occasions 14 days apart. The testing procedures included the performance of the Four Station Fundamental Motor Test (4-SFMT). The newly constructed 4-SFMT consisted of four fundamental skills/tasks: space covering (ROLL), overcoming resistance (PULL), object control (BALL), and overcoming obstacles (CLIMB) skills. The performance was evaluated with a 22-point scale with the different criterion for each skill and measured by time. Concurrent validity was assessed by determining the correlation with Test of Gross Motor Development (TGMD-2). The level of agreement across trials were statistically significant for all three raters, with two variables presenting excellent (ICC > 0.9), and two variables having good reliability (ICC > 0.75 and < 0.9). No significant differences were found between test and re-test scores, indicating the test's high reliability. Factor analysis isolated only one motor factor (accounting for 43.99% of the variance with the eigenvalue of 1.768) from four tasks. There was a large correlation (r = -0.576, $p < 0.01$) between process and product-oriented assessments of the 4-SFMT. Moreover, significant correlations were found between 4-SFMT and TGMD-2 for score (r = 0.824, $p < 0.001$) and time (r = -0.652, $p < 0.001$), which points to good concurrent validity of the newly constructed test. Construct validity was confirmed by small to moderate correlations between tasks (0.016 to -0.509) and no differences between boys and girls in total score ($p = 0.943$) and time (0.49). The 4-SFMT appears to be a valid and reliable tool that can be used to evaluate MC in children between the ages of 5 and 6 and is reasonably simple to use.

Keywords: preschool children, physical testing, motor competence

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1. Introduction

Human motor development is a process that includes progressions and regressions of motor competence throughout life [1]. The prevailing opinion is that in lifespan, motor development is the most important, i.e., the most sensitive period from birth to 6 years of age [2]. In that period, as many as three phases of motor development change (reflex phase, phase of elementary movements, and phase of basic motor patterns). It is believed that children cannot reach their full motor potential if their motor development is not stimulated in the specified period[3]. This is extremely important knowledge because motor competence (MC) in children and adolescents is directly related to numerous health-related outcomes including physical activity [4], physical fitness [5], lower body mass index [6], cardiorespiratory fitness [7], well-being [8]even cognitive health [9]. Although there is a relatively large number of tests for assessing MC in children and adolescents, most of them were developed for clinical purposes and are used to identify children with motor impairment or medical deficits [10]. Moreover, the implementation of most tests takes a long time [11], and a good number of them require special equipment and props, which also reduces their practicality, i.e., applicability. On the other hand, it is known that testing children in early childhood is very demanding, and care should be taken that it does not take too long, that the environment is safe, and that in general the implementation of testing is not a negative experience for these children [12].

The results of some research are interesting, showing that in early childhood, there is still no clear differentiation of motor abilities in children [13]or motor skills [14]. In other words, all factors of motor competence of children of that age should be relatively highly correlated with each other. In practice, this would mean that by determining only one motor segment of the child (regardless of whether motor performance or qualitative motor achievements were tested), the general state of the MC of that subject could be assessed quite precisely. Therefore, is it justified to carry out long-term testing protocols with a whole series of subtests for the assessment of motor competence if it is possible to determine this with one simple and quick test? This particularly applies to situations when the testing time is limited (e.g., in preschool and school institutions during the physical education lesson), and the goal is not to determine motor impairment or medical deficit but to identify sports talent [15] or simply assess the MC level of preschool or early school-age children.

For the purposes of this research, just such a test was constructed. Its duration is relatively short and can be applied as a product- and process-oriented test or even both. Also, the newly constructed test has a relatively high ecological validity because the tasks are carried out alternately in continuity [16], and it does not require expensive equipment. Therefore, the main goal of this research was to create a new test for assessing the motor competence of children of preschool and early school age and to determine some of its psychometric properties.

2. Materials and Methods

2.1. Study design

The Four Station Fundamental Motor Test (4-SFMT) construction and evaluation process consisted of several phases: development stage (identification of test 4-SFMTitems/tasks); reliability study stage - assessment of test consistency, where two aspects were addressed, i.e., test-retest reliability and inter-rater and intra-rate reliability; and validation (comparison with the criterion test for concurrent validity assessment and correlation between tasks for construct validity).

2.2. Participants

In order to establish the psychometric properties of the 4-SFMT, a convenience sample of 30 preschool children (12 girls and 18 boys) from 5 to 6 years was recruited. There were no behavioral, neurological, or musculoskeletal issues or learning impairments among the children who participated in this experiment. Before the children participated in this study, their parents and guardians received a letter with information about the study and signed the informed consent. Parents were clearly informed that the child could withdraw from the experiment at any time without giving a reason

2.3. 4-SFMT development

The 4-SFMT was created by a group of four experts with extensive knowledge in motor skill development, early-childhood physical education, measurement methodology, and sports pedagogy. The panel group was requested to evaluate each skill for age-appropriateness and feasibility. Additionally, experts were asked to give their opinions and suggestions about particular skill and the test. The 4-SFMT was designed to follow the curriculum for physical education, which defined minimal standards at the preschools of the Republic of Croatia [17]. Children's physical education classes were analyzed in order to evaluate tasks and skills that kids typically use in these settings. Furthermore, test items (tasks)were categorized into the following groups according to their utility[18]: 1) space covering skills (various types of rolling, looping, crawling, walking, and running that allow humans to cover distances on various types of surfaces, and directions); 2) overcoming resistance skills (a variety of pushing, pulling, holding, and carrying techniques used to overcome the passive resistance of objects of different volumes and shapes); 3) object control skills (simple and complex operations of managing objects that differ in quantity, shape, and volume in a specific time and place by using a variety of throwing and catching, targeting, and shooting skills) and 4) overcoming obstacles skills (different forms of crawling through a narrow space, climbing, landing, and jumping that assist us in overcoming various types of vertical, diagonal, and horizontal obstacles without the use of any technical or other types of devices).

After careful examination, it was deemed to include only one task from all four groups of basic motor skills to fulfill the study's main aim of constructing simple and short test. Therefore, the expert panel proceeded to develop a framework for the 4-SFMTby selecting the four tasks that best represent a certain movement skills area:

1) rolling on the mat with an upward arms position for space covering skill (ROLL). The task was performed on the soft mat with dimensions of 200 x 100 cm and a thickness of 5 cm. The child had to roll with their hands in an upward position from the beginning to the end of the mat.
2) pulling the body on the bench for overcoming obstacles skill (PULL). The task was performed on the wooden bench with dimensions of 340 x 26 surface and a height of 36 cm. The child had the task to start pulling his body from the beginning of the bench to the end. Only cotton shirt was allowed to avoid unnecessary friction due to the nature of the material (e.g., plastic print).
3) pushing the ball over the bench for object control skill (BALL). The task was performed on the same wooden bench as in the PULL task. The child had the task to take the 400 grams plastic ball with a diameter of 20 cm (the ball usually used in rhythmic gymnastics) and guide it on the surface of the bench from beginning to end. The task was performed with the dominant hand, which was determined by having the kid do three unimanual tasks, drawing a line with a pencil, cutting paper with scissors, and inserting a peg in the instructor's hand. The dominant hand is the hand used for most tasks [19].
4) climbing on the wooden ramp for overcoming obstacles skill (CLIMB). The task was performed on a wooden ramp measuring 85 x 250 cm that was set on the Swedish ladder from the ground to the height of 110 cm. The ramp had twenty-nine holes measuring 15 x 8 cm for easier climbing. The child had the task to climb the board and touch the mark set at 130 cm.

The final version of the test consisted of four aforementioned tasks that were required to perform in one trial in a circular manner (Figure 1). Every task was photographed and shown to the children to ensure they understood the type of movement selected for the test. The exact order of execution was as follows: ROLL, PULL, BALL, and CLIMB. The tasks were arranged in this order to ensure the participating children's safety and allow for several transitions between various skill sets. Additionally, it was observed that children occasionally had difficulty transitioning easily from one skill to the next, so the less complex skills were administered first. Moreover, the CLIMB task was administered last to ensure a safe environment for the children properly. Performance assessment was done in two ways: quantitatively (by measuring time) and qualitatively (by scoring each task).

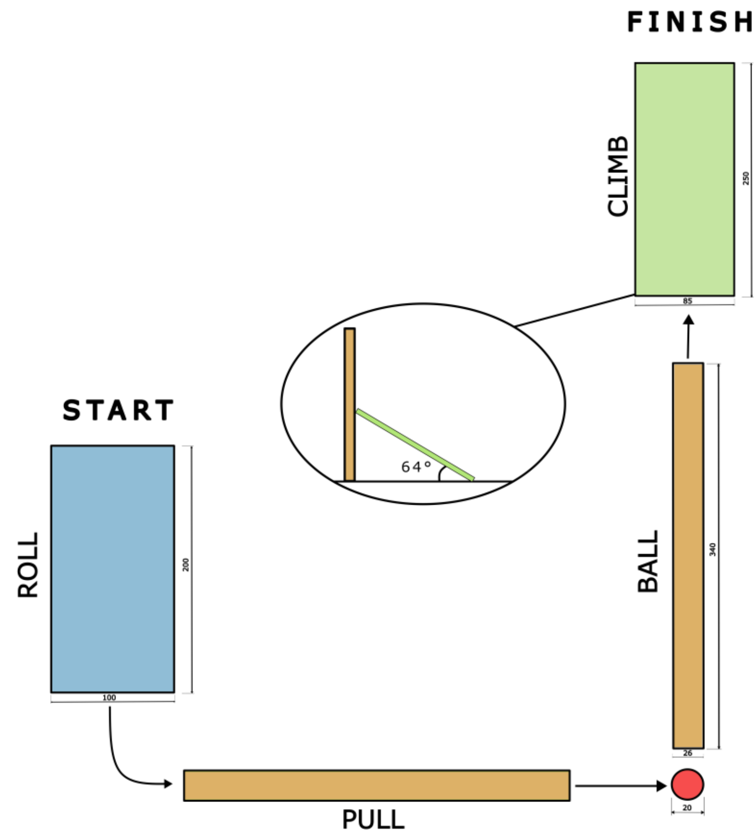

Figure 1. Schematic representation of the 4-SFMT. Dimensions are presented in centimeters.

2.4. Development of a 22-point skill scale

To evaluate each task, a 22-point score assessment scale was developed. The scale consisted of different criterions for each task: three for the ROLL, BALL, and CLIMB, and two for the PULL. For each criterion, ratings of 0, 1, and 2 were assigned (a detailed description of each criterion is presented in Table 1). As a result, each participant has had the chance to achieve a maximum of 22 points. The panel of three experts (research scientists with a Ph.D.) with a background in motor learning and skill development was recruited to establish the instrument's face and content validity.

2.5. Procedures

The testing protocol was conducted in a sports hall resembling the typical preschool gymnasium during the day. Individual tests on children were conducted by principal researcher and assistant (both kinesiology experts) trained in the testing procedures. Each test item was described and demonstrated before the child started the test. Verbal assistance and encouragement were given to participants at every stage of the testing process. First, children performed 4-SFMT. The principal researcher instructed the child to prepare and start the test by saying, "Go!" while the assistant started measuring time with the stopwatch. The test was finished when the child performed the last task in the test. Each child performed the test only one time. After the 4-SFMT, children were instructed to perform the Test of Gross Motor Development (TGMD-2 [20]. The test is divided into two subtests (the locomotor skills subtest and the object control skills subtest), with six skills each. The locomotor subtest consists of the following six skills: run, gallop, hop, leap, jump, and slide. The object control subtest consists of the following six skills: striking a stationary ball, stationary dribble, catching, kicking, overhand throw, and underhand roll. Depending on the test, each skill has a set of three to five criteria, and each one is scored with a 0 or 1. The child performs each skill twice; therefore, each skill's maximum score ranges from 6 to 10. The test began when the principal researcher instructed the child to prepare and start the test by saying, "Go!".

Table 1. Description of a 22-point skill score

Task	Criterion	Description	Score
ROLL	arms	flexed elbow joint, abduction of the shoulder joint (bent and extended arms)	0
		extended elbow joint + folded arms (outstretched and folded arms)	2
		some of the elements (spread, flexed)	1
	movement direction	in a straight line	2
		turns, significant loss of the direction of straight movement	0
		small deviations	1
	legs	flexed knees, abduction of the hip joint (bent and extended legs)	0
		extended knees + contracted legs (extended and contracted legs)	2
		some of the elements	1
PULL	arms	sync + full range	2
		one of the arms is dominant	0
		incomplete or excessive extent of withdrawal or one brief period where dominant arm was leading	1
	legs	knees extended and contracted (legs extended and contracted)	2
		falls to the side, pushes off with his toes	0
		succeeds, but with flexed knees or extended knees and abduction in the hip joint	1
BALL	palm control	bounces the ball with fingers or leads with both palms	0
		pushes the ball in a controlled manner with the entire palm	2
		uncomplete control - fingers or palm or occasionally helps with the other hand	1
	the direction of ball movement	falls	0
		direction is followed	2
		zigzag movement	1
	ball disposal	does not complete the task, does not dispose the ball, has no intention	0
		the ball is disposed in a controlled manner	2
		disposal is started but failed	1
CLIMB	movement pattern	contralateral pattern	2
		ipsilateral pattern	0
		combination of two	1
	body length	maximum use of body length	2
		shortened, incomplete movements	0
		incomplete, something in between	1
	the use of the climbing bord	holes are used correctly	2
		constant mistakes, does not enter the foot	0
		occasional mistakes	1

2.6. Reliability estimates

The reliability of a test can be described as the consistency of the test results, e.g., the extent to which that same test would produce the same results under the same conditions when repeated several times [21]. The consistency of a 4-SFMT was evaluated using test-retest and inter-rater/intra-rater reliability. Therefore, children performed 4-SFMT on two separate occasions with a time frame of two weeks between the test and re-test. The amount of time between two test administrations can have an impact on test-retest reliability. Carryover effects due to memory or practice are more likely if the length interval is very short, whereas a longer interval can increase the chances of changes in these parameters. Each performance was videotaped to assess the inter-rater and intra-rate reliability of a skill scale, and participants were fully informed that they would be videotaped throughout the test. For better video assessment, two cameras were used to record the videos (GoPro Hero 7 Black; GoPro, San Mateo, CA). After the video recordings were processed, three raters with extensive experience in physical education conducted the performance evaluation. Recordings were given to raters for evaluation (scoring) using guidelines after they were briefed on the procedures and study aims.The following instructions were given to each rater: (a) strictly follow the assessment scoring scale; (b) when scoring was complete, do not rewind the clip; and (c) try to complete the evaluation at the same time of day [22]. The order of the videos was randomly chosen.

2.7. Validity

The newly constructed test should be assessed for various types of validity when scores are used for the intended purpose. Two types of validity were tested for the 4-SFMT: concurrent and construct validity. Concurrent validity involves correlating a newly constructed instrument concurrently with some criterion (reference test). The TGMD-2 was the criterion used for comparison with the 4-SFMT. Previous research has shown that this test is reliable and valid for this age group [23,24]. Construct validity refers to the degree to which a test measures the construct it was designed to measure, and several factors can be used to demonstrate this type of validity. For the purposes of this study, sex differentiation and correlation between four task was assessed. As this test consists of four tasks representing four groups of basic motor skills (dimensions) [18], each task should have a significant positive correlation with the overall test score and a moderate correlation with each other. Moreover, there should not be differences according to sex in this age as it is the early stage of motor development [25].

2.8. Statistical analysis

All data were analyzed with SPSS 28.0 statistical software (SPSS, Chicago, IL, USA) and GraphPad Prism 9 (GraphPad Software, Inc., San Diego, CA, USA) and are presented as mean and standard deviation after the normality of data was confirmed with Shapiro-Wilk test. To evaluate the level of agreement across trials to establish evidence of inter-rater, intra-rater objectivity, and test–re-test reliability, intra-class correlation coefficients (ICC) with 95% confidence intervals (95%CI) were calculated from a two-way mixed-effects model for absolute agreement. The ICC is a value between 0 and 1, where values below 0.5 indicate poor reliability, between 0.5 and 0.75 moderate reliability, between 0.75 and 0.9 good reliability, and any value above 0.9 indicates excellent reliability [26] Paired t-test was used to determine systematic bias/difference between two testing occasions (test/re-test). Additionally, the standard error of measurement (SEm) and standard error of measurement expressed as coefficient of variation (CV%) were calculated to determine within-individual variation, and the 95% confidence interval was also presented. Bartlett's Test of Sphericity [27] and The Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy [28] as used to determine the suitability of the data for factor analysis which was performed to find meaningful underlying dimensions. A value of 0.60 was the minimum standard to determine matrix factorability in KMO. Exploratory factor analysis (EFA) was performed using principal component extraction and eigenvalues > 1. Scree test was used to decide how many factors to retain [29]. However, although considered the best and easy to administer, the Scree test involves searches for sharp distinctions between the eigenvalues, and sometimes there may be more than one demarcation point. Moreover, the reliability of scree plot interpretations is found to be low [30]. Therefore, Parallel Analysis (PA) and Velicer's Minimum Average Partial (MAP) test [31] were conducted as supplementary analyses. Both PA and MAP were conducted using the O'Connor (2000) SPSS syntax. As suggested by Comrey and Lee (2013), the factor loadings were interpreted as: excellent (>0.71), very good (>0.63 and <0.71), good (>0.55 and <0.63), fair (>0.45 and <0.55), and poor (>0.32 and <0.45). Values of 0.32 should be the minimum threshold used to identify significant factor loadings [33]. Pearson product-moment correlation coefficient (r) associated with 95%CI and coefficient of determination (R2) were calculated to examine the relationship between each item and the total score and performance time and to establish the relationship between the 4-SFMT and TGDM-2 test. The magnitude of the correlations was also determined using the modified scale by Hopkins (2000): 0.1, trivial; 0.1–0.3, small; 0.3–0.5, moderate; 0.5–0.7, large; 0.7–0.9, very large; .0.9, nearly perfect. An unpaired t-test was conducted to determine differences in 4-SFMT raw scores and performance time between gender. All effect sizes for appropriate analyses were calculated using Cohen's d [35], with values of <0.2, >0.2 and <0.6, >0.6 and <1.2, >1.2 and <2.0, and ≥2.0 considered as trivial, small, medium, large, and very large effects, respectively. The level of statistical significance for analyses was set at $p < 0.05$

3. Results

3.1. Inter-rater and intra-rate reliability

Intra- and inter-rater reliability values for the 4-SFMT score are presented in Table 1. Evidence for inter-rater objectivity was excellent (ICC > 0.9) for ROLL, PULL, and overall score and good (ICC > 0.75 and < 0.9) for BALL and CLIMB. Evidence for intra-rater reliability for the skill score ranged from excellent for the overall score and moderate for BALL for all three raters.

3.2. Test-retest reliability

Table 2 shows the means and standard deviations of test and re-test scores, CV%, and the 95% confidence intervals for the ICCs and SEm. ICCs between test and re-test scores ranged from 0.558 to 0.995. No significant differences were found between test and re-test scores, although small effects were detected for ROLL and CLIMB.

3.3. Determination of the factorial structure with EFA

The factorial structure of 4-SFMT is presented in table 3. Significant Bartlett's Test of Sphericity (χ^2 = 11.471, p = 0.075) and KMO value of 0.61 indicates that a measure of the statistical probability that the correlation matrix had significant correlations among some of its components and that sample was adequate, respectively. By looking at the scree plot (not presented), one factor had an eigenvalue greater than 1, accounting for 43.99% of the variance with the eigenvalue of 1.768. PA revealed that the raw data eigenvalue from the actual data was greater than the eigenvalues of the 95th percentile of the random data distribution for one factor. Additionally, Velicer's MAP test confirmed a one-factor solution. A Chi-square goodness of fit test determined that the one-factor model fit the data well, $\chi^2(2) = 0.18$, p = 0.916. As shown in table 3, ROLL and PULL had excellent loadings for Factor 1, while PULL and CLIMB had fair loadings.

Table 2. Intra- and inter-rater reliability for 4-SFMT score

Reliability		**ICC**	**95%CI**
Inter-rater			
Raters	ROLL	0.927	0.819 to 0.968
	PULL	0.953	0.909 to 0.976
	BALL	0.823	0.515 to 0.926
	CLIMB	0.778	0.433 to 0.904
	Total	0.914	0.395 to 0.975
Intra-rater			
Rater 1	ROLL	0.89	0.678 to 0.963
	PULL	0.826	0.474 to 0.942
	BALL	0.626	-0.156 to 0.836
	CLIMB	0.846	0.558 to 0.948
	Total	0.961	0.883 to 0.987
Rater 2	ROLL	0.916	0.75 to 0.972
	PULL	0.751	0.272 to 0.916
	BALL	0.714	-0.147 to 0.904
	CLIMB	0.703	0.088 to 0.901
	Total	0.963	0.893 to 0.988
Rater 3	ROLL	0.932	0.8 to 0.977
	PULL	0.911	0.736 to 0.97
	BALL	0.627	-0.149 to 0.876
	CLIMB	0.816	0.467 to 0.938
	Total	0.967	0.903 to 0.989

Legend: ICC = intraclass correlation coefficient; 95%CI = 95% confidence interval.

Table 3. Means and standard deviations of test and re-test scores and measures of reliability

	test		**re-test**							
variable	**mean**	**SD**	**mean**	**SD**	**ES**	**ICC**	**95% CI**	**SEm**	**95% CI**	**CV%**
ROLL	2.91	1.39	2.58	1.53	0.223	0.877	0.645 to 0.958	0.637	0.438 to 1.164	5.94
PULL	2.8	0.86	2.82	1.04	0.035	0.889	0.665 to 0.963	0.401	0.276 to 0.733	21.15
BALL	2.68	0.89	2.67	1.08	0.007	0.558	-0.405 to 0.885	0.853	0.586 to 1.557	44.28
CLIMB	4.34	0.74	4.18	0.76	0.214	0.85	0.569 to 0.949	0.402	0.277 to 0.734	11.2
Total score	12.22	3.41	12.25	3.16	0.009	0.968	0.9203 to 0.989	0.907	0.624 to 1.655	8.53
Time	76.08	27.07	74.54	25.79	0.058	0.995	0.984 to 0.998	2.652	1.824 to 4.842	3.34

Legend: ES = effect size; ICC = intraclass correlation coefficient; SEm = standard error of measurement; CV% = standard error of measurement expressed as coefficient of variation; 95%CI = 95% confidence interval

Table 4. Factor loadings from EFA

variable	Factor 1
ROLL	0.8
PULL	0.46
BALL	0.81
CLIMB	0.51

3.4. Construct validity

Table 4 shows the results of correlations between the 4-SFMT total score and inter-item correlation matrix. As expected, all item correlations with total score were positive and significant. The highest correlation with the total score was with BALL (R^2 = 0.572, t = 6.122, very large). A significant negative correlation between total score and performance time was observed (R^2 = 0.332, t = -3.727, moderate). Correlations between scores on individual items were significant only between ROLL and BALL (R^2 = 0.247, t = 3.03, small). Performance time significantly correlated with ROLL (R^2 = 0.259, t = -3.127, small) and BALL (R^2 = 0.218, t = -2.796, small).

Differences between boys and girls in the 4-SFMTtotal score and performance time are presented in table 5. There were no significant differences in both variables (total score [t = 0.072; d = 0.014: trivial] and performance time [t = 0.669; d = 0.14: trivial])

Table 5. Correlation analysis between 4-SFMT total test score and time and inter-item correlation

Item	Correlation with total score	95% CI	Inter item correlation				
			ROLL	PULL	BALL	CLIMB	time
ROLL	0.724**	0.492 to 0.86	1	0.224	0.497**	0.199	-0.509**
PULL	0.533**	0.213 to 0.749		1	0.191	0.016	-0.233
BALL	0.757**	0.545 to 0.878			1	0.269	-0.467**
CLIMB	0.505**	0.177 to 0.732				1	-0.348
Time	-0.576**	-0.775 to -0.272					1

Legend: ICC = interclass correlation coefficient; 95%CI = 95% confidence interval; ** p> 0.01

Table 6. Differences between boys and girls in 4-SFMT total score and performance time.

	boys (n = 18)		girls (n = 12)		
variable	mean	SD	mean	SD	*p*
Total score	12.15	2.62	2.92	1.53	0.943
Time	65.81	24.77	71.97	21.78	0.49

Legend: *p* - probability value

3.5. Concurrent validity

Correlations between the 4-SFMT total score and performance time with TGMD-2 score are presented in Figures 1 and 2. Figure 2 shows significant positive correlations between the 4-SFMT total score and TGMD-2 score (r = 0.824, R^2 = 0.679, t = 7.696 *p* <0.001). The correlation between 4-SFMT performance time and TGMD-2 score was significant and negative (r = -0.652, R^2 = 0.425, t = -4.574, *p* <0.001).

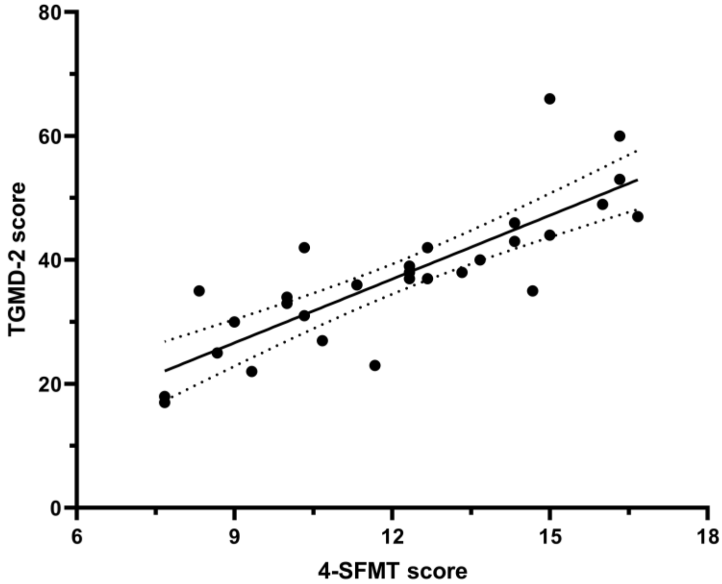

Figure 3. Correlation between 4-SFMT total score and TGMD-2 score

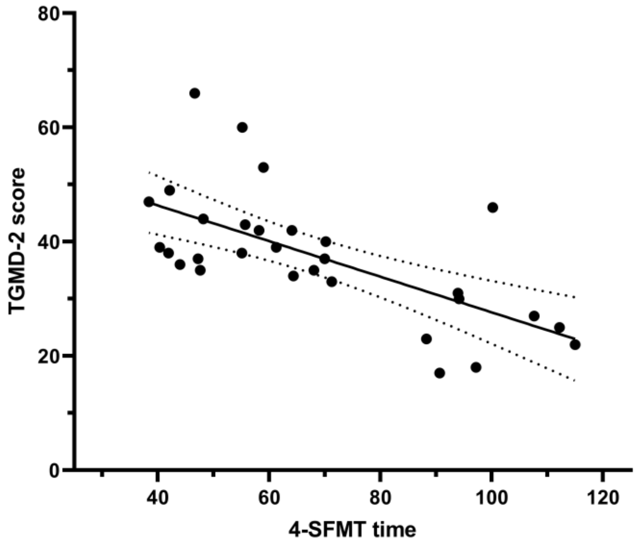

Figure 4. Correlation between 4-SFMT performance time and TGMD-2 score

4. Discussion

The main aim of this study was to create a new test for assessing the motor competence of children of preschool and early school age and to determine its reliability and validity. The main findings were: (a) all ICC values that represent the level of agreement between raters were statistically significant for all three raters, with two variables presenting excellent (ICC > 0.9), and two variables having good reliability (ICC > 0.75 and < 0.9). (b) No significant differences were found between test and re-test scores, although small effects were detected for two tasks, indicating the test's high reliability. (c) Through factor analysis, one motor factor F1 was isolated from four tasks representing space covering, overcoming resistance, object control, and overcoming obstacles skills. (d) There is a large correlation between process and product-oriented assessments of the 4-SFMT. (e) Statistically significant correlations (from large to very large) were found between process and product-oriented assessments of test 4-SFMT and test TGMD-2, which points to good concurrent validity of the newly constructed test. (f) There is no statistically significant difference in the quantitative and qualitative results of the newly constructed test between boys and girls.

The results confirmed that the criterions for evaluating certain motor skills of the 4-SFMT were well defined because all indicators of agreement between experts had acceptable values (ICC from 0.778 to 0.953). Moreover, the obtained values are comparable to those of already validated and long-term applied tests on a sample of preschool children [11]. Somewhat lower reliability values (test-retest scores) of the 4-SFMT can be observed only in one task, while the values of the remaining tasks as well as the overall process and product of the obtained result, are excellent. It is a task for assessing object control skills (BALL) where children had the task of rolling a ball on a bench. This task is probably the most complex in terms of its structure and is less familiar to children than the other locomotor tasks in the test. It is known that object control skills are acquired later and are generally more difficult than locomotor skills [1]. From the results of intra-rater reliability (Table 1). It is also noticeable, that all three experts showed the lowest values of agreement precisely in that task.

One of this study's interesting findings is the factor analysis results. Namely, although the 4-SFMT is structured by four items that assess the slightly different skill domains of gross MC, factor analysis isolated only one construct - the factor of general motor competence. Such results are in accordance with some previous findings [18,36] and confirm the hypothesis stated in the introduction about the absence of strict differentiation of MC in children of that age. However, further research on a larger sample of subjects and with a larger number of tests is necessary in order for such conclusions to receive relevant scientific confirmation.

The correlation coefficients between scores on individual items are relatively low and are significant only between ROLL and BALL ($R^2 = 0.247$, $t = 3.03$). However, when determining the validity, it is not recommended that the correlations between the tasks are too high because this would mean that they measure the same ability to the same degree and therefore are redundant [20].On the other hand, there is a significant connection between performance time and total score, which points to the conclusion that the quality of the performance of given motor skills significantly affects the speed of performance of these skills. This is in line with previous empirical evidence that indicates a moderate to very large association between process and product-oriented assessments [37,38]).

One of the goals of the research was to determine the concurrent validity of the newly constructed test. For this purpose, Pearson's correlation coefficient was calculated between the performance time and total score of the 4-SFMT on the one hand and the results in the TGMD test on the other (Figures 2 and 3). Both correlations are significant, with a higher coefficient recorded in the total score compared to performance time ($r = 0.824$ versus $r = -0.652$). Such a result was expected since the total score was obtained by qualitative assessment of motor skills, which is very close to the method of evaluating the TGMD test, which belongs to the category of criterion-referenced tests. Ultimately, no significant differences were found in the analyzed variables between boys and girls (total score [$t = 0.072$, $p = 0.943$]; performance time [$t = 0.669$ $p = 0.49$]) which confirms that test is design for the purposes of measuring what it is supposed to measure (construct validity). There are numerous studies that have been concerned with determining differences in MC between genders in preschool children, where a certain inconsistency is observed in the results obtained [2]. Hovewer, in most research boys, performed better than girls in manipulative skills, and girls performed better than boys in balancing and locomotor tasks. These differences in motor skills are attributed to environmental rather than biological factors [39].

This research also has certain limitations. For more relevant scientific conclusions, the sample of participants should be expanded in terms of number and age. Also, it would be desirable in future research to include the body mass index (BMI) variable in children, which is directly related to performance in motor competence tests [40].

5. Conclusions

In conclusion, the 4-SFMT is a reliable and valid tool that can be used to assess MC of 5-6 year old children. It is relatively easy to administer, whether it is a process or product-oriented test. It can be carried out quickly, and it does not contain expensive props, making it ecologically valid.

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