



A CROSS-COUNTRY VALIDATION BETWEEN KOSOVO AND THE NETHERLANDS OF THE DUTCH PERCEPTUAL-MOTOR SKILLS ASSESSMENT FOR TALENT DETECTION IN TABLE TENNIS

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Abstract

Background. This study focused on the cross-country validation of the Dutch perceptual-motor skills assessment used for talent detection in table tennis which also could be the basis to create country-specific norm values in young children (aged 7 to 9).

Materials and methods. In total, data from 172 children from Kosovo and 219 children from the Netherlands were compared. The data consisted of the outcomes of seven items of the Dutch perceptual-motor skills assessment evaluating gross motor function (i.e., sprint and vertical jump) and ball control (i.e., throwing a ball, speed while dribbling, aiming at target, ball skills and eye-hand coordination). A multivariate GLM analysis revealed significant differences between the two countries with large effect sizes regarding both constructs. Preliminary normative values are presented per country.

Results. The results show that perceptual-motor skills can vary between children of the same age and sex between European countries. For that reason, it seems sensible to further investigate the necessity of establishing norm values per country and also the underlying mechanisms that might reveal why and how cross-country differences arise.

Conclusions. Moreover, it might make sense to study an international sample of recreational and high performance youth and adult players to create a benchmark for talent detection and talent identification in table tennis. This will likely gain more insight into what the key aspects are to participate in table tennis and what is necessary for the elite level.

Keywords: racquet sport, youth, motor skills, testing.

Introduction

Talent detection is about the discovery of potential athletes in a heterogeneous population that are currently not involved in a specific sport (Vaeyens, Lenoir, Williams, & Philippaerts, 2008). Talent detection can be helpful in stimulating sports activities in young kids to find a sport that fits them best (Pion, 2015). An optimal connection between

the child's strengths and personal preferences and the sport is likely to increase the chances of success. For this reason, it is important to have a good insight in the typical profile of a certain sport (Pion, Teunissen, ter Welle, Spruijtenburg, Faber & Lenoir, 2020). Since performance in many sports rely on a child's perceptuo-motor abilities, it seems sensible to develop a so-called 'sport perceptuo-motor profile' and include a perceptuo-motor assessment within the talent detection process. This is especially the case for technique-based sports, like table tennis (Faber, Pion, Munivvana, Faber & Nijhuis-Van der Sanden, 2018).

Table tennis is generally considered as an early start sport with a large impact of the technical skills level on performance (Faber, Damsma & Pion, 2020). This has two consequences. First, children aiming to participate and especially those who want to excel in this sport will benefit from an early exposure to table tennis specific activities (Faber, Zamoscinska, Teunissen & Pion, 2020). Second, a certain level of sport-related perceptuo-motor abilities (e.g. speed, agility, eye hand coordination and ball control) are important for the development of the difficult technical skills (Faber, Koopmann, Büsch & Schorer, 2021). These aspects have impact on the approaches for talent development and should be taken into account for talent detection in table tennis; it seems sensible to organize talent detection already at an early age-span (i.e. 7 - 8 and 9 years) and include an assessment specifically valid for table tennis.

The Netherlands Table Tennis Association developed a perceptuo-motor assessment that was evaluated as part of the talent detection process (Faber, Elferink-Gemser, Faber, Oosterveld & Nijhuis-Van der Sanden, 2016). This assessment included eight test items: sprint, vertical jump, agility, throwing a ball, speed while dribbling, aiming at target, balls skills, eye-hand coordination. A first evaluation revealed good prospects for its added value to talent detection in the Netherlands; a discriminant analysis showed that approximately 30% of the primary school children fit the perceptuo-motor profile of young table tennis players. Especially, the items assessing ball control seem to be of value (i.e., throwing a ball, speed while dribbling, aiming at target, balls skills, eye-hand coordination). Talent detection programs to support children to find a sport that fits their strengths and personal preferences could benefit from adding this assessment.

Although this first evaluation showed promising results in the Netherlands, it is recommended to investigate the assessment's cross-country validity. Such an evaluation will provide insight whether the results and conclusions are generalizable to young populations outside the Netherlands. Previous studies in perceptuo-motor skills assessments showed that generalizability of the results and conclusions to other populations are not always straightforward. For example, a cross-country validation of the Movement Assessment Battery for Children-2 revealed that reference norms based on normative samples from the UK needed to be adapted in order to use the assessment as a diagnostic tool in the Netherlands and Flanders (the Dutch-speaking part of Belgium) (Niemeijer, van Waelvelde, & Smits-Engelsman, 2015). Also, studies using the first edition of the Movement Assessment Battery for Children with norm tables based on American normative samples, showed that cultural differences in performance on the test items existed and that for use in non-American children, the norms needed small adjustments (Niemeijer, van Waelvelde, & Smits-Engelsman, 2015; Engel-Yeger, Rosenblum & Josman, 2010; Pienaar, 2004). Also other studies revealed cross-country or cross-cultural differences between populations of children regarding their motor skills (Valentini, Nobre & Gonçalves Duarte, 2022; Bardid et al., 2016; Veldman, Jones, Santos, Sousa-Sá, & Okely, 2018).

For this reason, this study focused on a cross-country validation of the Dutch perceptuo-motor skills assessment used for talent detection in table tennis which also could be

the basis to create country specific norm values (Berisha & Çilli, 2020; Berisha M. Ç., 2018) in girls and boys between 7 to 9 year-old living in Kosovo. Providing the cross-country validation intends to support talent detection in table tennis and determine the perceptuo-motor skill level of the children living in Kosovo (Berisha, M, 2021). Based on the results, children who show higher abilities may be oriented to table tennis, as children who show lack perceptuo-motor and physical activities will be suggested and oriented to the beneficial activities for health and active life.

Materials and methods

Study design

In line with the purpose of the present study, the cross-sectional design was used, where two independent groups were compared and analyzed, which aims to determine the differences between 7-8-9 years of children living in Kosovo and the Netherlands in perspective of gross motor skills and ball control tests of Table tennis players. The causal-comparative method, which aims to determine the reasons for an existing / naturally occurring situation or event, differences in these causes, and the contributing variables or the results of an effect, were used.

Sample

The study sample consists of 117 girls and 55 boys from Kosovo and 51 girls and 138 boys from the Netherlands (Table 1). The included children go to a regular primary school within their country. Both children participating ($\pm 90-95\%$) and not participating (5-10%) in a sport were included. The participants included in the study and their parents were informed by written form about the benefits and risks (even no risks were detected) of the study. The study was conducted according to the Helsinki Declaration which protects the privacy of the volunteers.

Table 1. Study sample

Age (years)	Girls (n)		Boys (n)	
	Kosovo	Netherlands	Kosovo	Netherlands
7	67	10	14	47
8	43	30	25	34
9	7	41	16	57
Total sample	117	81	55	138

Perceptuo-motor skills assessment

For this study, seven items of the perceptuo-motor skills assessment of the Netherlands Table Tennis Association were administered: sprint, vertical jump, throwing a ball, speed while dribbling, aiming at target, balls skills, eye-hand coordination (Faber, Elferink-Gemser, Faber, Oosterveld, & Nijhuis-Van der Sanden, 2016; Netherlands Table Tennis Association, 2011). Sprint and vertical jump are considered to assess the player's gross motor function and speed while dribbling, aiming at target, balls skills, throwing a ball and eye-hand coordination are considered to assess their skills concerning ball-control (Faber, Nijhuis-Van Der Sanden,

Elferink-Gemser, & Oosterveld, 2015). Each item includes an untrained task to diminish the effect of learning. Excluding authentic table tennis tasks was chosen to better estimate the potential for table tennis than the performance of specific sport skills themselves (Gagné, 2004; Morrow, Jackson, Disch, & Mood, 2011; Vaeyens, Lenoir, Williams & Philippaerts, 2008) The standardization of the test items is captured in protocols, which includes a detailed description of materials, set-up, assignment, demonstration, training phase, testing phase, and registering test scores (Faber, Elferink-Gemser, Faber, Oosterveld, & Nijhuis-Van der Sanden, 2016; Netherlands Table Tennis Association, 2011). A reproducibility study using a test-retest design showed acceptable intraclass correlation coefficients ranging from 0.79–0.88 ($P < 0.01$) with coefficients of variation between 3–6% (Faber, Nijhuis-Van Der Sanden, Elferink-Gemser & Oosterveld, 2015).

The Dutch primary school children were tested using the perceptuomotor skills assessment during 3 physical education lessons within a period of 3 weeks. The 7 test items were divided over the 3 testing sessions for feasibility reasons. The children performed a warm-up prior to testing. The assessors were sport trainers or physiotherapy students, who were well-trained to guarantee that the test protocols were used in a standardized way; they first familiarised themselves with the test protocol and instructions and then they were given feedback during a training session by an expert of the Netherlands Table Tennis Association.

The Kosovar children have also been tested in a similar way, during Physical Education classes, mainly in the morning hours over a period of 3 weeks. The assessors were trainers table tennis, physical education teachers, previously well-trained for the testing standards.

Gross motor function

Sprint (SP): this test included a pyramid-shaped circuit in which players need to gather and return five table tennis balls one by one as fast as possible from five different baskets starting at the basis of the pyramid-shaped circuit. Time was measured in seconds and the best of two attempts was used as the final score.

Vertical jump (VJ): players were instructed to stand next to a wall and jump and touch the wall with their fingertips as high as possible. The difference between jumping and standing height with one arm up along the wall was measured in centimetres. The best of three attempts was used as the final score.

Ball control

Throwing a ball (TB): the players threw a table tennis ball as far away as possible with their preferred hand. The distance from the starting point at the marked line to the point of the ball's first bounce was measured in meters. The best of three attempts was used as the final score.

Speed while dribbling (SD): used a zigzag circuit in which the players needed to move sideways as fast as possible while dribbling with a basketball using one hand. Players had one attempt in which time was measured in seconds.

Aiming at target (AT): players needed to hit around the target (Ø 60 cm) on the floor at 2.5-meter distance with a table tennis ball using a standard bat with their preferred hand. Forehand and backhand had to be used alternately

during the attempts. A hit in the target's center (Ø 0.20 m) or the outer ring yielded 6 and 4 points, respectively. The total score of ten attempts was registered as the final score.

Balls skills (BS): this test also required hitting a round target on the floor (Ø 75 cm), but now players needed to throw a table tennis ball with their preferred hand via a vertical table tennis table from two different positions (1 and 2-meter distance away from the target). Each player had a total of twenty attempts. A hit in the centre (Ø 0.335 m) or the outer ring of the target yielded 2 and 1 points, respectively. The total score of the twenty attempts was registered as the final score.

Eye-hand coordination' (EH): players were instructed to throw a ball at a vertical table tennis table at 1-meter distance using one hand and catch the ball correctly with the other hand as frequently as possible in 30 seconds. The number of correct catches was scored.

Statistical analysis

IBM SPSS Statistics 26 (IBM Corp., Armonk, New York, USA) was used for the statistical analysis. The normality of the data was determined by using skewness and kurtosis values. Multivariate General Linear Model (GLM) analyses were used to test whether differences existed between the children from Kosovo and the Netherlands regarding gross motor function and ball control while using sex and age as covariates. This analysis included univariate outcome concerning differences on test item level. Partial eta squared were calculated as effect sizes. An effect around 0.01 was considered small, around 0.06 moderate and around 0.14 or higher as large (Cohen, 1988). Alpha was set at 0.05 for significance for all analysis. Based on the test's normality the determination of preliminary normative values was made by using the descriptive, frequency, and percentile values divided into five equal portions (percentiles).

Results

Table 2 presents the descriptive results per test items for girls and boys per age and per country. The multivariate GLM analysis revealed significant differences between the countries for both gross motor function and ball control with large effect sizes (gross motor function $F = 40.205$, $p < 0.001$, $\eta^2 = 0.172$ and ball control $F = 33.037$, $p < 0.001$, $\eta^2 = 0.301$). Children from the Netherlands outperformed the children from Kosovo concerning gross motor function and this was the other way around for ball control. Also the univariate comparison reveal significant differences on all test items ($p < 0.05$) between the children from Kosovo and the Netherlands, except for the test item 'eye hand coordination' ($p = .219$). Moderate to large effects sizes were seen for the test items 'vertical jump' ($\eta^2 = 0.163$), 'speed while dribbling' ($\eta^2 = 0.130$), 'aiming at target' ($\eta^2 = 0.098$) and 'ball skills' ($\eta^2 = 0.126$). Table 3 presents preliminary percentile scores for children from Kosovo and the Netherlands that could serve as normative values.

Discussion

Based on the results of the current study, it can be concluded that perceptuo-motor skills vary between children from Kosovo and the Netherlands. For that reason, it seems

Table 3. Preliminary normative values, i.e., percentile scores, for the perceptuo-motor skills per sex and age group

Age	Country	Sex	PCTL	Gross motor			Ball control			
				SP (s)	VJ (cm)	SD (s)	AT (points)	BS (points)	TB (m)	EH (points)
7-year olds	Netherlands	Girls	20 th	35.0	18.4	36.7	4	3	6.0	0
			40 th	35.4	23.1	39.3	4	8	7.2	4
			60 th	37.6	26.2	43.4	8	10	8.1	1
		Boys	20 th	37.0	18.0	30.1	0	4	5.3	0
			40 th	39.0	22.5	33.9	4	9	6.3	0
			60 th	40.2	26.0	40.7	8	15	7.0	3
	Kosovo	Girls	20 th	36.0	14.6	32.1	8	12	6.3	2
			40 th	39.8	18.0	35.2	12	14	7.2	3
			60 th	41.9	19.0	38.1	16	16	8.3	4
		Boys	20 th	35.7	15.0	33.6	8	9	6.2	2
			40 th	38.8	18.0	36.3	12	11	6.8	3
			60 th	41.2	19.0	38.0	15	14	7.3	4
8-year olds	Netherlands	Girls	20 th	35.6	21.0	27.7	8	3	6.2	0
			40 th	36.2	24.0	31.7	6	10	7.0	2
			60 th	37.4	27.2	36.5	12	12	7.9	5
		Boys	20 th	33.0	21.5	23.9	0	6	6.7	1
			40 th	36.3	24.0	26.1	8	10	8.2	4
			60 th	37.4	27.0	31.1	16	15	9.8	9
	Kosovo	Girls	20 th	35.2	14.0	15.8	8	12	6.9	3
			40 th	37.5	18.0	22.6	12	16	7.4	3
			60 th	40.0	22.0	28.3	20	19	8.1	4
		Boys	20 th	35.9	15.0	18.5	8	12	6.2	2
			40 th	37.1	18.0	22.1	12	16	7.2	3
			60 th	39.7	21.2	27.0	21	18	7.8	5
9-year olds	Netherlands	Girls	20 th	32.9	25.4	22.5	4	9	7.0	1
			40 th	35.5	29.0	27.1	4	13	7.6	2
			60 th	37.4	31.0	32.4	11	15	8.8	10
		Boys	20 th	32.9	24.6	20.4	4	11	8.5	4
			40 th	35.1	27.0	23.4	12	15	9.2	9
			60 th	37.2	30.0	24.6	20	18	10.7	12
	Kosovo	Girls	20 th	37.1	13.2	15.8	7	13	6.6	3
			40 th	38.6	16.0	21.2	14	18	7.8	5
			60 th	39.9	21.6	28.2	19	20	9.0	5
		Boys	20 th	32.3	12.4	16.8	20	12	6.5	4
			40 th	35.1	16.0	18.7	23	14	7.5	7
			60 th	36.9	22.0	19.4	30	22	8.52	9

SP (s): Sprint, VJ (cm): Vertical Jump, SD (s): Speed While Dribbling, AT (points): Aiming at Target, BS (points): Ball Skills, TB (m): Throwing a Ball, EH: Eye hand coordination

mechanisms that might reveal why and how cross-country differences arise. Moreover, for talent detection in table tennis, it might also make sense to include an international sample of recreational and high-performance youth and adult players. This will likely gain more insight into what the key-aspects are to participate in table tennis and what is

necessary for the elite level. It must be emphasized that this research and the perceptuo-motor skills assessment is only intended to improve talent programmes to help children to find a sport that fits their strength and personal preferences and accommodates them at the specific level of their abilities. It is never intended to limit the freedom of choice in youth.

Trainers and coaches should also be conscious of the possible risks of early specialization and selection at such a young age (e.g., injuries, mental exhaustion and dropouts).

Conflict of interest

The researcher declares that there is no conflict of interest in this research.

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МІЖДЕРЖАВНА ПЕРЕВІРКА МІЖ КОСОВО ТА НІДЕРЛАНДАМИ НІДЕРЛАНДСЬКОЇ ОЦІНКИ ПЕРЦЕПТИВНО-МОТОРНИХ НАВИЧОК ДЛЯ ВИЯВЛЕННЯ ТАЛАНТІВ У НАСТІЛЬНОМУ ТЕНІСІ

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

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Історія питання. Увагу в цьому дослідженні зосереджено на міждержавній перевірці нідерландської оцінки перцептивно-моторних навичок, яку використовують для виявлення талантів у настільному тенісі та яка також могла б стати основою для створення специфічних для країни нормативних значень для маленьких дітей (віком від 7 до 9 років).

Матеріали та методи. Загалом порівнювали дані 172 дітей із Косова та 219 дітей із Нідерландів. Дані склалися з результатів семи пунктів нідерландської оцінки перцептивно-моторних навичок, які оцінювали загальну моторику (тобто спринт і стрибок угору) і контроль м'яча (тобто кидок м'яча, швидкість під час ведення, прицілювання в ціль, навички володіння м'ячем і координацію очей і рук). Багатовимірний аналіз узагальненої лінійної моделі виявив статистично значущі відмінності між двома країнами з великими розмірами впливу щодо обох конструктів. Попередні нормативні значення представлені для кожної країни.

Результати. Результати показують, що перцептивно-моторні навички можуть відрізнятися в різних дітей одного віку та статі в різних країнах Європи. Із цієї причини видається доцільним продовжити дослідження необхідності встановлення нормативних значень для кожної країни, а також основних механізмів, які можуть виявити, чому та як виникають відмінності між країнами.

Висновки. Крім того, можливо, було б доцільно вивчити міжнародну вибірку молодих і дорослих гравців любительського та високопрофесійного класу, щоб створити еталон для виявлення та визначення талантів у настільному тенісі. Імовірно, це дасть змогу краще зрозуміти, які ключові аспекти передбачені для участі в настільному тенісі та що необхідно для елітного рівня.

Ключові слова: ракетковий спорт, молодь, моторні навички, тестування.

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