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THE INFLUENCE OF PHYSICAL THERAPIST APPROACH IN THE PARENT'S COMPLIANCE OF INFANTILE CEREBRAL PALSY DIAGNOSED CHILDREN. A RANDOMIZED CONTROLLED TRIAL

Alexandru Mădălin DINA^{1*}, Victorița PAVEL²

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ABSTRACT. Many methods of approaching the parents or guardians of neuromuscular diagnosed 0-4 years old children have been investigated, and the most efficient on the long period of time, as the diagnose needs a long-term medical program, has been found to be the clearly, detailed and constructive information. The lack of discernment and reason of a 0-4 year old child make his family role essential after the medical diagnose, especially the parents or guardians (P/G). The study's objective is to demonstrate that the physical therapist relationship with P/G determines his treatment compliance. The research is based on the data collected from 2 groups, representative sample and a control group. Both groups followed the instructions of the medical rehabilitation program *DinaCord* which had a 4 months duration, being designed the same but having other approach from the physical therapist side, depending on which group the subjects belonged. The specialist's participation must be active in both ways of transmitter and receiver. Thereby, the transmitted information is received then processed by the parent or guardian depending on the reception and empathize of the physical therapist by the paraverbal, nonverbal and verbal parent or guardian feedback. As results, the rehabilitation program has better output when the physical therapist's P/G approach is optimized, compared to a passive information transmitter physical therapist. The conclusions underline the parent or guardian (P/G) compliance potential in the physical therapy program

¹ *National University of Physical Education and Sports, Faculty of Physiotherapy, U.N.E.F.S., Bucharest, Romania*

² *Recumed Medical Center, Bucharest, Romania.*

* *Corresponding author: dina_alex76@yahoo.com*

as he is let know about all the information consisting of the diagnosis, the approach (the therapy, the consequences, the result projection in an estimated period of time) and the influence of an active participation from his part.

Keywords: *active participation, parent or guardian compliance, cerebral palsy, rehabilitation, physical therapist approach.*

REZUMAT. Influența abordării fizioterapeutului asupra complianței părintelui copilului diagnosticat cu paralizie cerebrală infantilă. Studiu clinic randomizat.

Există numeroase studii care au investigat metodele de abordare a părinților sau tutorilor copiilor cu vârsta 0-4 ani diagnosticați cu sindrom neuromuscular de către fizioterapeuți. Iar cele mai eficiente pe o perioadă lungă de timp, deoarece diagnosticul necesită un program medical de recuperare de lungă durată, s-au dovedit a fi cele în care sunt prezentate informații clare, detaliate și constructive. Lipsa de discernământ și rațiune a unui copil de 0-4 ani fac ca rolul familiei sale să fie esențial după diagnosticare, în special a părintelui sau tutorelui (P/T). Obiectivul acestui studiu este să demonstreze că relația fizioterapeutului cu P/T influențează complianța acestuia la tratament. Cercetarea se bazează pe colectarea datelor de la 2 grupe, un grup ce reprezintă un eșantion reprezentativ al populației și un grup de control. Ambele grupe au urmat instrucțiunile programului de reabilitare medicală DinaCord, care a avut o durată de 4 luni, însă abordarea fizioterapeutului a fost diferită. Participarea specialistului trebuie să fie activă în ambele roluri, de emițător și receptor. Astfel, informațiile sunt transmise către P/T și apoi procesate de către acesta, în funcție de recepționarea lor și empatizarea de către fizioterapeut a răspunsului paraverbal, nonverbal și verbal al P/T. Ca rezultat, programul de recuperare medicală are rezultate mai bune atunci când abordarea P/T de către fizioterapeut este optimizată, în comparație cu o abordare pasivă a transmiterii informațiilor de către fizioterapeut. Concluziile acestui studiu subliniază potențialul complianței la tratament a părintelui sau tutorelui în cadrul programului de recuperare medicală, prin transmiterea acestuia a datelor cu privire la diagnostic, abordare (terapia aplicată, consecințe, proiecția rezultatelor pe o perioadă estimată), cât și influența unei participări active din partea sa.

Cuvinte cheie: *participare activă, complianța părintelui sau tutorelui, paralizie cerebrală, recuperare medicală, abordarea fizioterapeutului.*

INTRODUCTION

The upper motor neuron lesion is represented by any injury of the motor neurons located above the nuclei of the cranial nerves or the spinal cord's anterior horns (Emos & Agarwal, 2021). The totality of the symptoms which define the central motor neuron lesion is called the upper motor neuron syndrome (UNMS).

The main characteristics is the alteration of the motor coordination, fine motor skills, muscle fatigue and accentuation of spasticity, dystonia, synkinesis, clonus, osteotendinous reflexes (Murvanidze, 2017).

The most common type of the central motor neuron injury is the cerebral palsy, as it is the most common cause of disability at the child age (Morgan et al., 2021).

In the recent studies made by CDC (Centers for Disease Control and Prevention of U.S.), it is observed the incidence of cerebral palsy around the world with 1.5 – 4 cases per 1000 children (Durkin et al., 2016). In Europe, there are 80 cases per 1000 births for 28-35 weeks of gestation and 1 to 1.7 cases per 1000 births for at least 37 weeks of gestation (Pakula et al., 2009).

The study entitled *Medical expenditures attributable to cerebral palsy and intellectual disability among Medicaid-enrolled children*, published by Vijaya Kancherla et al. in 2012, showed how much it costs the yearly medical aid for a child with cerebral palsy, in comparison with a child who has not a known diagnosis. The study was made on the children registered in 2005 on the *Medicaid* medical platform. The total medical costs for the entire year for a child without a known diagnosis were \$1674, for a child with cerebral palsy were \$16721 (almost 1000% out of \$1674) and for a child with cerebral palsy and mental retardation were \$43338 (about 2600% of \$167).

The study made in 2012 by Koshy & Brabin on the population of Liverpool shows us the reducing tendency of the parent's compliance.

According to Menahem & Halasz (2000), the number of non-compliance parents is growing and related to the anxiety state. There is a direct relation between anxious people and unwell or unable to comply the specialist's recommendations. Also, Baias & Sandor (2023) describe that parents who have a better understanding of adaptive sport actively promote the participation of children with disabilities into physical education activities.

The study realized in 2019 by Hielkema & Boxum, demonstrates the importance of an active role of parents in the physical therapy program, with a minimal difference between a physical therapy program applied by parent (82) versus physical therapist (81). The evaluation scale used were *Gross Motor Function Measure - GMFM* – (Alotaibi, et al., 2013) and a video measurement system called *Infant Motor Profile* (Heineman et al., 2011).

OBJECTIVE

Our objective is to demonstrate that an optimized physical therapist relationship with P/G determines a good treatment compliance for his cerebral palsy diagnosed child.

MATERIALS AND METHODS

Subjects

Between September 2017 and June 2021, it was elected a group of 25 subjects with the formal and informal consent of the P/G. This study was a randomized controlled trial and was made in the clinic's pediatric department of Recumed Medical Center Bucharest and Regina Maria Bucharest. All the subjects were diagnosed with UNMS, evaluated and treated by the physical therapy program. The subjects selection was made by following the myofascial and functional evaluation to know clearly the motor capacity and the impairment level of each subject.

The inclusion criteria of the subjects was:

- the upper motor neuron syndrome diagnosis (consisting in cerebral palsy);
- 0-2 years motor age;
- 0-4 years chronological age;
- P/G minimal compliance;
- similar clinical picture.

The exclusion criteria of the subjects was

- any other diagnosis than the upper motor neuron syndrome;
- >2 years motor age;
- >4 years chronological years age;
- no P/G treatment compliance.

The subjects were divided into two groups, as below:

- *group 1* - 15 subjects;
- *group 2* - 10 subjects;
- each accepted subject received a number, in the order of acceptance, as follow:
 - for the group 1, a number from 1 to 15;
 - for the group 2, a number from 1 to 10;
- the acronym 'G1' for the group 1 subjects and the acronym 'G2' for the group 2 subjects.

Instruments

The subjects from both groups, group 1 and group 2, were evaluated from the neuromotor, somatic and osteopathic point of view with the complex evaluation scale *DinaCord*.

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DinaCord's evaluation scale is divided as follows:

- *the motor evaluation:*
 - the assessment score obtained on each motor development intermediate stage;
 - the total score of all motor tests which quantify the subject's motor development;
 - the percentage represents the subject's neuromotor development level compared with a 2 year old subject with an unaltered neuromotor development level, which is the maximum percentage. The maximum score (100%) is 240 points and the minimum optimal score (80%) is 192 points;
 - the neuromotor age is reported to the minimum optimal score value (80%) per motor age compared to the maximum score per motor age;
- *the somatic evaluation;*
- *the osteopathic evaluation.*

By considering the 2 years old motor age as the final stage of the neuromotor rehabilitation process, the *DinaCord* evaluation system (Table 1) has expressed the obtained score of each subject in percentage by reporting it to the maximum possible score (240 points). On this way, we appreciated the rehabilitation pace and we were able to predict the neuromotor evolution of the subject.

Table 1. The neuromotor development appreciation in the DinaCord system

Motor age	Maximum score per motor age/ Percentage of maximum total score	Minimum optimal score per motor age/ Percentage of maximum total score
1 month	6 / 2.5%	4.8 / 2%
2 months	12 / 5%	10 / 4.16%
3 months	20 / 8.33%	16 / 6.67%
4 months	57 / 23.75%	45.6 / 19%
5 months	75 / 31.25%	60 / 25%
6 months	115 / 47.29%	92 / 38.33%
7 months	123 / 51.25%	98.4 / 41%
8 months	153 / 63.75%	122.4 / 51%
9 months	175 / 72.92%	140 / 58.33%
10 months	190 / 79.17%	152 / 63.33%
11 months	210 / 87.5%	168 / 70%
12 months	220 / 91.67%	176 / 73.33%
15 months	225 / 93.75%	180 / 75%
18 months	230 / 95.83%	184 / 76.67%
24 months	240 / 100%	192 / 80%

A considered full recovered subject means he has both ages correlated, the chronological and the motor one.

Methods

As Forsyth et al. (2022) conclude in his study, both groups followed the instructions of the medical rehabilitation program *DinaCord* which had a 4 months duration, being designed the same but having other approach from the physiotherapist side, depending on which group the subjects belonged. In other words, the P/G of the 15 subjects from the group 1 received a high amount and explicit information of what does it mean the diagnosis, the physiotherapy program's approach, the consequences involved in such a diagnose, the result projection for a 4 months therapy and for a long term therapy, similar cases as examples and the influence of an active participation from their part.

The P/G of the 10 subjects from the group 2 received very few information about the diagnosis, the physiotherapy program's approach, the consequences involved in such a diagnose, the result projection for a 4 months therapy and for a long term therapy, similar cases as examples and the influence of an active participation from their part.

The *DinaCord* rehabilitation program represents a set of myofascial and bone manipulations followed by active and pasivo-active physical exercises, all in a specific order. Depending on the part of the body involved, the proposed rehabilitation program is structured as follows:

- segmental - applied techniques on the neck and trunk level;
 - applied techniques on the upper limbs level;
 - applied techniques on the lower limbs level.
- global - globally functional techniques.

We used the Mann-Whitney U test to compare the differences between our two independent groups, the experimental and the control one. Instead of choosing t-test, because the assumptions are not met, we chose the Mann-Whitney U, which means that sample distributions are not normally distributed and the sample sizes is small. The probability value's level of significance used is >0.05 , representing the standard of probability that the alternative hypothesis is true.

For statistical processing the data, it had been used Microsoft Office Excel version 16.66. The use of this tool is due to his multitude of statistical procedures, the table processing program and graphical integration of data.

RESULTS

All the subjects included in this study had the same diagnose, infantile cerebral palsy, each one of them met the inclusion criteria and didn't meet the exclusion criteria.

The percentage value is the percentage of the total score of the subject which is compared with the maximum possible score (240); it's the parameter that shows the evolution pace of the subject.

The motor age represents the neuromotor development level of the subject and is related to the chronological age.

The total score represents the sum of all points obtained in by a subject in each motor race.

The processed data shows significant differences between the two evaluations, initial and final on both groups (Table 2 and Table 4).

Table 2. Group 1- motor evaluation results

Registered number	Total score			Percentage (%)			Motor age		
	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference
1	78	161	83	32	67	35	5 1/2 months	10 1/2 months	5 months
2	116	166	50	48	69	21	7 1/2 months	11 months	3 1/2 months
3	34	73	39	14	30	16	3 1/2 months	5 1/2 months	2 months
4	10	140	130	4	58	54	2 months	9 months	7 months
5	10	31	21	4	12	8	2 months	3 1/2 months	1 1/2 months
6	59	80	21	24	33	9	5 months	5 1/2 months	1/2 months
7	155	194	39	64	80	16	10 months	2 years	1 year and 2 months
8	9	25	16	3	10	7	1 1/2 months	3 1/2 months	2 months

Registered number	Total score			Percentage (%)			Motor age		
	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference
9	146	218	72	60	90	30	9 1/2 months	2 years	1 year and 2 1/2 months
10	83	173	90	34	72	38	5 1/2 months	1 year	6 1/2 months
11	89	112	23	37	46	9	6 months	7 1/2 months	1 1/2 months
12	125	176	51	52	73	21	8 months	1 year	4 months
13	100	143	43	41	59	18	7 months	9 months	2 months
14	120	177	57	50	73	23	8 months	1 year	4 months
15	162	223	61	67	92	25	10 1/2 months	2 years	1 year and 1 1/2 months
Average	86.4	139.4	53	35.6	57.6	22	6.1 months	11.5 months	5.4 months

The Mann-Whitney U test was applied to the experimental group and the results demonstrated that there is a significant difference between the initial and final evaluation (Table 3). The U-value is 56, comparing with critical U-value which is 64; the Z-score is -2.32277. The p-value is 0.02034, while the effect size index $r = 0.599$ meaning that the results are conclusive.

The Mann-Whitney U test was applied to the experimental group and the results demonstrated that there is a significant difference between the initial and final evaluation (Table 5). The U-value is 31, comparing with critical U-value which is 23; the Z-score is -1.39847. The p-value is 0.16152, while the effect size index $r = 0.44$ meaning that the results are conclusive.

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Table 3. Mann-Whitney U test for initial and final evaluation of group 1

	Values
U-value	56
Critical U-value	64
Z-score	-2.32277
p-value	0.02034
r	0.599

Table 4. Group 2 - motor evaluation results

Registered number	Total score			Percentage (%)			Motor age		
	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference
1	45	69	24	18	28	10	4 months	5 1/2 months	1 1/2 months
2	117	141	24	48	58	10	7 1/2 months	9 months	1 1/2 months
3	94	104	10	39	43	4	6 1/2 months	7 1/2 months	1 month
4	109	119	10	45	49	4	7 1/2 months	8 months	1/2 months
5	92	107	15	38	44	16	6 months	7 1/2 months	1 1/2 months
6	35	38	3	14	15	1	3 1/2 months	3 1/2 months	0
7	104	126	22	43	52	9	7 1/2 months	8 months	1/2 months
8	71	92	21	29	38	9	5 1/2 months	6 months	1/2 months
9	98	106	8	40	44	4	7 months	7 1/2 months	1/2 months
10	105	131	26	43	54	11	7 1/2 months	8 1/2 months	1 month
Average	87	103	16	35	42	8	6.2 months	7.1 months	0.9 months

Table 5. Mann-Whitney U test for initial and final evaluation of group 1

	Values
U-value	31
Critical U-value	23
Z-score	-1.39847
p-value	0.16152
r	0.44

The difference between initial evaluation and final evaluation (Table 6) of the average group 1 total score (53) is superior in term of value, in comparison with the average group 2 total score (16).

The difference between initial evaluation and final evaluation of the average group 1 motor age (5.4 months) is superior in comparison with the average group 2 motor age (0.9 months).

Table 6. The difference between the 2 groups on initial and final evaluation

Registered number	Total score -average-			Motor age (months) -average-		
	Initial evaluation	Final evaluation	Difference	Initial evaluation	Final evaluation	Difference
G1	86.4	139.4	53	6.1	11.5	5.4
G2	87	103	16	6.2	7.1	0.9
Difference G1 - G2	-0.6	36.4	37	-0.1	4.4	4.5

The Mann-Whitney U test was applied on the initial evaluation score and the results demonstrated that there is not a significant difference between the experimental and control groups (Table 7). The U-value is 74, comparing with critical U-value which is 39; the Z-score is 0.02774. The p-value is 0.97606, as there are no significant difference between the two groups.

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Table 7. Result of intergroup Mann-Whitney U test - initial score

	Values
U-value	74
Critical U-value	39
Z-score	0.02774
p-value	0.97606

The Mann-Whitney U test was applied on the final evaluation score and the results demonstrated that there is a significant difference between the experimental and control groups (Table 8). The U-value is 41, comparing with critical U-value which is 39; the Z-score is 1.85825. The p-value is 0.6288, meaning that the results are conclusive.

Table 8. Result of intergroup Mann-Whitney U test - final score

	Values
U-value	41
Critical U-value	39
Z-score	1.85825
p-value	0.6288

DISCUSSION

The results show that the rehabilitation specialist has a very important role in the therapy. Not only to apply the learned methods, but also to lead the entire relationship between the child, P/G and himself. Spending time on making the P/G understand all the information and consequences, it's a game changer for the entire therapy and furthermore for the child's life. According to Morgan et al. (2021) there is a recommendation for parents psychological support, as they are experiencing anxiety, stress or depression. Menahem & Halasz (2000) also said that 56% of the children from foster home have mental instability diagnosed parents.

The results demonstrate that the physical therapy's compliance of the P/G leads to a better evolution of the upper motor neuron syndrome. According to Whittingham, Sanders, McKinlay & Boyd (2016) the empathic and evidence-based communication is necessary for the parents, as new concerns and issues are raised.

Further research can make a better understanding of how to work on the most efficient physical therapist's approach in relation with the P/G.

CONCLUSIONS

Our research has clarified the issue of applying the typology of treatment applied to patients diagnosed with upper motor neuron lesion with motor age 0-2 years and chronological age 0-4 years. The optimized physical therapist's approach is a game changer for the P/G compliance.

The results after the 4 months physiotherapy method *DinaCord* sessions proposed, including functionally active physical exercises with myofascial stress relief and the amelioration of the bone relations, were very conclusive, as the P/G compliance was high for all the cases for the subjects from group 1 but low for all the cases for the subjects from group 2.

The processed data analysis of difference between the percentage score of initial evaluation and the final evaluation shows that the compliance of P/G is essential for an efficient rehabilitation. Otherwise, the communication role between physical therapist and P/G is directly related to the P/G compliance level.

The group 1 obtained a higher value of functional level (53) compared to group 2 (16). The *DinaCord* evaluation scale was the quantification tool through which the values had been calculated as the average difference between the initial evaluation and final evaluation.

After comparing the average total score values obtained by the two groups, we conclude that an objective, proactive and detailed communication can make the difference between an efficient or not physical therapy session.

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Otilia Teodora LIBER^{1*}, Iacob HANȚIU¹

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ABSTRACT. Introduction. Contemporary dance, with influences from ballet and gymnastics, is an appealing and effective way of practising physical drills in an entertaining way. **Objective.** The aim of the study was to verify the effect of a 4 week contemporary dance training programme and of some measuring tools as well as the analysis of the entertainment contemporary dance on the motor skills and body balance of the 6-9 year old children. **Materials and Methods.** The subjects were 16 girls of 6-9 years of age ($M=7$, $STDEV=1,06$) who attended contemporary dance training sessions twice a week for a period of 4 weeks. The level of the motor skills was evaluated through standing broad jump (SBJ), back saver sit & reach with alternatively reached legs (S&R_RL – right leg reached, S&R_LL – left leg reached), Matorin test (MatT), crunches (C). The balance was measured standing on both legs (SBL) and on one leg (SOL) on Wii Balance Board from Nintendo (WBB), connected to SeeSway, Ross Clark software. The resulting data were analysed with the SPSS programme. **Results.** There have been identified statistically significant differences between the initial and final measurements when testing the motor skills and improvements in the balance parameters between the two evaluations, but these differences have not been statistically significant for any of the parameters measured. **Conclusions.** The study shows that a 4-week workout programme of entertainment contemporary dance may contribute to the development of motor skills. Also, the measuring tools are adequate and easy to use.

Key words: contemporary dance, 6-9 year-old girls, motor skills, balance, Wii Balance Board.

¹ Babeş-Bolyai University, Faculty of Physical Education and Sport, Doctoral School, Cluj-Napoca, Romania.

* Corresponding author: burz.teodora@yahoo.com

REZUMAT. Efectele dansului contemporan asupra calităților fizice și echilibrului la fete de 6-9 ani: studiu pilot. Introducere. Dansul contemporan, cu influențe din balet și gimnastică, este un mijloc atractiv și eficient de practicare a exercițiilor fizice în scop recreativ. **Obiective.** Scopul studiului a fost verificarea efectului unui program de antrenament de dans contemporan 4 săptămâni și a instrumentelor de măsurare, precum și analiza influenței dansului contemporan recreativ asupra calităților motrice și echilibrului la copii de 6-9 ani. **Materiale și Metode.** Subiecții au fost 16 fete de 6-9 ani ($M=7$, $STDEV=1,06$), care au participat la antrenamente de dans contemporan de două ori pe săptămână timp de 4 săptămâni. Nivelul calităților motrice s-a evaluat prin: săritura în lungime de pe loc (SBJ), flexia longitudinală a trunchiului cu picioarele extinse alternativ înaintea (S&R_RL – piciorul drept extins, S&R_LL – piciorul stâng extins), testul Matorin (MatT), ridicarea trunchiului în așezat (C). Echilibrul a fost măsurat în pozițiile stând pe ambele picioare (SBL) și pe un picior (SOL) pe placa de echilibru Wii Balance Board de la Nintendo (WBB), conectată la software-ul SeeSway, Ross Clark. Datele au fost prelucrate statistic cu ajutorul programului SPSS. **Rezultate.** S-au identificat diferențe semnificative statistic între măsurătorile inițiale și finale la testarea calităților motrice, iar la parametrii echilibrului îmbunătățiri între cele două evaluări, dar diferențele nu au fost semnificative statistic pentru nici unul dintre parametrii evaluați. **Concluzii.** Studiul indică faptul că, un program de antrenament de dans contemporan recreativ, cu durată de 4 săptămâni, poate contribui la dezvoltarea calităților motrice. Totodată, instrumentele de măsurare sunt adecvate și ușor de folosit.

Cuvinte cheie: dans contemporan, fete în vârstă 6-9 ani, calități motrice, echilibru, Placă de echilibru Wii.

INTRODUCTION

The recreational physical activities have caught the attention of various experts in different activity fields due to their influence on our daily life. During childhood, practising physical drills is good both for the improvement of the body systems and functions as well as for the mental well-being and cognitive development (Landry, Driscoll, 2012; Robinson et al., 2016; Warburton et al., 2006).

In Ancient Greece, dance was considered important due to its contribution to the physical, emotional and mental growth and development of the children (Lawler, 1964). Contemporary dance is a physical activity through which a person may express and transmit ideas, feelings, and emotions by means of body movements and gestures (Payne, Costas, 2021). In choreography, it is often used one or more of the techniques of the modern dance but various elements of gymnastics, classical ballet, steps from other dancing styles may be introduced (Payne, Costas, 2021).

In order to experience the benefits of dancing, it is essential that the practitioners should possess the motor skills necessary for acquiring the technique. According to Roche and Huddy (2015), if the dancer does not have the physical ability to realize the movements and the creative resources to adapt them to his or her needs, there may appear feelings of frustration.

For dancing, as well as for adaptation to the daily activities, it is necessary to have a certain level of motor skills. Even though these are improved with age, it is essential that in the first school years specific drills which aim to develop the physical abilities should be practised (Barela, 2013).

The training which focuses on the ballet technique imply muscle toning and coordination development, in order to raise the capacity of maintaining balance in various situations (Schmit et al., 2005). According to Batista (2022), flexibility is a basic motor skill in classical ballet, but also in contemporary dance and gymnastics. The entertainment gymnastics implies practising certain elements which suppose flexibility, balance, force and coordination as well as those which are considered acrobatic or various jumps which have a lower degree of complexity compared to those belonging to the performance gymnastics (Jackowski et al., 2015).

OBJECTIVE

The aim of the present study was to analyse the influence of recreational contemporary dance on the motor skills of the 6-9 year old children. Also, we focused on the analysis of the intervention programme and on the measurement tools which will be used in the research.

MATERIALS AND METHODS

The subjects of our study were 16 girls aged between 6 and 9 ($M = 7$, $STDEV = 1.06$) who practised for the first time a physical activity in an organised environment. The written approval from the parents was obtained. The subjects attended two sessions of recreational dance training a week for a period of four weeks after classes. Each session lasted for 60 minutes.

The intervention programme

The intervention programme consisted in 8 sessions of contemporary dance training practised recreationally. The preparation of the body for effort was done on music, after the classical method in contemporary dance, and in the end some stretching movements through maintaining a position of maximal amplitude for 10 seconds were performed (Figure 1).

Following that, during the first training session of the week (T1) some static ballet drills and artistic jumps were practised, while during the second session (T2) some acrobatic elements were performed. At the end of each session a game for body recovery after effort was played and three minutes of relaxing stretching on music with a very low rhythm followed.



Figure 1. Stretching exercises

The training intensity was moderate and the complexity was high for the training level of the subjects. Throughout the session the correctness of movements was focused on in order to facilitate the process of acquiring the motor skills. In the first two weeks out of 60 minutes, the effective working time was 35 to 40 minutes and the rest of 20 minutes was dedicated to explanations, demonstrations and correcting of the possible mistakes that appeared in the performance. In the final two weeks, the pauses for explanations were reduced to 10-15 minutes.

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During the activity, out of the 5 feet positions from the ballet, we used position 1 (P1), position 2 (P2) and position 3 (P3), and out of the arms positions were used the bras bas position (BB), position 1 (P1) and position 5 (P5).

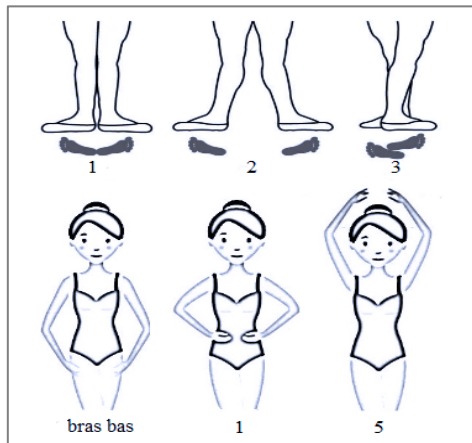


Figure 2. Feet and arms positions

The drills practised were: relevé from P1 with arms in P5 (4 x), relevé from P2 with arms in P5 (4 x), demi Plié from P2 with arms in P1 (4 x), with feet in P2 and arms in BB, relevé with arms in P5, comeback, demi plié with arms in P1, comeback (4 x), maintaining pasé (4 seconds / leg).

The jumps used were: sauté from P1 (4 x), sauté from P2 (4 x), échappé from P1 in P2 and from P2 in P1 (8 x), changement (8 x), and in week 2 and 3 was added petit jeté jumping from P3 (4 x / leg).

In T2, after the exercises dedicated to developing flexibility, the subjects performed the following acrobatic elements:

- Forward rolls (in week 2 and 3, they were executed with a final high jump) – 5 x;
- Backward rolls (in week 2 and 3, they were executed with a final high jump) – 5 x;
- Side rolls with extended arms up (3 repetitions in a row) – de 5 x / side;
- Extended legs kneeled chin stand – 5 x;
- Wall supported flexed feet headstand – 3 x 5";
- Wall supported extended legs head stand– 3 x 5".

The measurements performed

Before and after the 4 weeks of training the motor skills were evaluated as follows: the coordination capacity through the Matorin test (MatT); the flexibility through measuring in centimetres the longitudinal flexion of the trunk with legs alternatively extended forward (S&R_RL- right leg extended, S&R_LL- left leg extended) from the level of the extended leg sole; the explosive force of the inferior limbs through measuring in centimetres the standing broad jump (SBJ); the force of the abdominal muscles through counting the crunches for a minute (C).

The evaluation of the subjects' posture balance was done through standing on both legs (SBL) and on one leg (SOL) with the arms close to the body and looking forward on the Wii Balance Board from Nintendo (WBB), connected to SeeSway, Ross Clark software. According to Clark & all, (2010), the equipment was validated for its use for educational, clinical and research aims.

In our research we analysed the movement of the pressure centre (COP) while maintaining each position for 30 seconds through the following parameters: the length in centimetres of the pressure centre trail on the support surface (LCop), the velocity of the trail travelled by COP in cm/s (VCop), the amplitude of the COP movement on anterior-posterior plan (AmplAp) and on medio-lateral plan measured in centimetres.

The collected data were analysed statistically by means of SPSS programme, version 2, and a descriptive analysis, the distribution verification and a comparison of averages in the variables envisaged will be carried out.

RESULTS

The motor skills evaluation

All the motor skills evaluation tests which were carried out show that the final measurements have registered higher averages than the initial measurements (Table 1).

As a result of the verification of the data distribution, through Shapiro-Wilk test, it was concluded that they were normally distributed at SBJ and S&R_LL variables ($p > .05$), but they were not normally distributed at MatT, S&R_RL and C variables in both moments of the measurements. ($p \leq .05$). Considering these results, for comparing the averages it was used the Pair Sample t-test in the case of normally distributed scores and the Wilcoxon test when the scores did not have a normal distribution. In both cases the differences between the averages were significant (Table 1).

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Table 1. Means, standard deviations and comparison of physical skills means according with distribution (N = 16)

	UM	Mean	STDEV	t*/Z**	df	Sig. (2-tailed)	Effect size (Cohen's D)
SBJ_M1	cm	87.00	12.97	-3.40*	15	0.004	-1.70
SBJ_M2	cm	91.81	15.22				
MatT_M1	degrees	185.63	15.37	-3.077**	-	0.002	-2.83
MatT_M2	degrees	240.63	43.58				
S&R_RL_M1	cm	-1.81	5.84	-3.109**	15	0.001	-2.59
S&R_RL_M2	cm	2.13	4.84				
S&R_LL_M1	cm	-2.94	5.43	-7.42*	15	0	-3.82
S&R_LL_M2	cm	1.50	5.25				
C_M1	nr	7.44	7.75	-3.072**	15	0.003	-1.78
C_M2	nr	12.00	9.93				

Note: * t-test; **Wilcoxon test

Consequent to performing the tests on pairs, statistically significant differences were noticed between the initial and final average values of the following parameters: standing leap and flexion of the trunk on the left leg (Table 1). Also, in the same table one can notice that the other three tests, Matorin, flexion of the trunk on the right leg and crunches – analysed through Wilcoxon test, the results show that the differences are significant, which suggests that the intervention programme influenced positively the motor skills analysed.

The balance evaluation

Evaluating the balance by means of the Wii Balance Board included testing standing on two legs (SBL) and standing on one leg (SOL).

When standing on both legs (SBL) the average values of the analysed parameters show slight improvements of the balance after the intervention programme – lower values in the final measurements (M2). The analysis of the distribution through the Shapiro Wilk test show that the scores registered were not evenly distributed, and the comparison of means using the nonparametric Wilcoxon test (Table 2) proved that the differences were not significant ($p > .05$).

Also, when testing SOL the averages scores of the analysed variables were lower in the final evaluation (Table 3), the distribution test Shapiro-Willk did not show values of $p > .05$ on both measurements and data comparison did not reveal significant differences between the two measurements p bidirectional having values higher than .05 (Table 4).

Table 2. Wilcoxon Signed Ranks Test for SBL test (N=16)

Statistics Test ^a		
Variable pair	Z	Asymp. Sig. (2-tailed)
LCop_2 - LCop_1	-1.241 ^b	.215
VCop_2 - VCop_1	-1.103 ^b	.270
AmplAP_2 - AmplAP_1	-1.288 ^b	.198
AmplML_2 - AmplML_1	-.427 ^b	.670

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks

Table 3. Descriptive Statistics SOL (N=16)

Descriptive Statistics				
Variable	UM	N	Mean	Std. Deviation
LCop_1	Cm	16	155.044	38.3339
LCop_2	Cm	16	137.806	37.8750
VCop_1	cm/s	16	5.163	1.2733
VCop_2	cm/s	16	4.600	1.2707
AmplAP_1	Cm	16	5.538	2.0915
AmplAP_2	Cm	16	6.825	7.1462
AmplML_1	Cm	16	4.987	2.6140
AmplML_2	Cm	16	4.525	3.0802
Valid N (listwise)		16		

Table 4. Wilcoxon Signed Ranks Test for SOL test (N=16)

Statistics Test ^a		
Variable pair	Z	Asymp. Sig. (2-tailed)
LCop_2 - LCop_1	-1.862 ^b	.063
VCop_2 - VCop_1	-1.848 ^b	.064
AmplAP_2 - AmplAP_1	-.031 ^b	.975
AmplML_2 - AmplML_1	-.852 ^b	.394

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

DISCUSSIONS

Standing broad jump (SBJ) is an evaluation tool used in the Physical Education classes in Romania, and due to this fact the subjects in this survey were used to performing it. Although the registered results show that the SBJ mean rises from 87.00 to 91.81 cm, and the intervention programme contained a lot of leaping exercises, one cannot conclude that the explosive force in the inferior limbs improves after practising these exercises in eight contemporary dance training sessions. The development of the muscle mass is a factor which may influence these modifications, but the subjects of the survey were aged between 6 and 9 years, during which period the muscular mass is not quite developed. (Cáceres et al., 2018). We consider that the leaps performed during the training sessions may influence the correctness of the execution technique of the standing leap, which may lead to the results improvement.

The data collected in the Matorin test, through which the coordinative capacity was evaluated showed the significant improvement of the average results between the two measurements, from 185.63 to 240.63. Although this motor skill improves in time, the optimal age for coordination improvement is 10 years old (Urichianu, 2020).

When performing the Matorin test, a part of the subjects had the tendency to ignore rules because of their desire to have better results and stepped outside the circle drawn for landing or they did not maintain the arms near the body during the jump. When offered the opportunity to repeat the jump, at the second trial the subjects managed to perform the test better.

When performing the longitudinal flexion of the trunk, a test used in order to evaluate flexibility, the subjects met some difficulties to maintain the leg extended. After further explanations and indications, the subjects fulfilled the task easily.

According to the tests the ability of longitudinally flexing the trunk improved statistically, both with the right leg extended forwards ($Z_{(15)} = -3.190$, $p = .001$) and with the left leg ($t_{(15)} = -7.416$, $p = .00$). These results suggest that the intervention programme had a positive impact on flexibility. Still, we have to consider the fact that the subjects are at the age when the resistance of the tissues when stretched is low, this being a factor which may influence the modifications appeared at the flexibility level (Magnusson, Renström, 2006).

When testing the crunches, there was identified a statistically significant difference between the values of the parameters averages C_M1 ($M = 7.44$) and C_M2 ($M = 12.00$), according to $Z_{(15)} = -3.072$, $p = 0.003$. These results show that the exercises from the intervention programme, done for a period of 4 weeks,

influenced positively the force of the abdominal muscles, for 12 subjects the number of crunches at the moment M2 being higher than at M1, and 4 subjects didn't manage to do crunches at the evaluations.

Although each test started with an explanation and a demonstration, when crunches were performed some subjects did not manage to raise their trunk in the first seconds because they were not used to the movement. Initially it was considered that they do not have the abdominal force necessary, but after some trials, they succeeded in performing at least one correct execution. Two of the subjects, after a first achievement, managed easily to perform at least 8 correct executions, for which reason we considered that less than a minute is not enough time for all the children to manage to perform crunches, even if they have the necessary abdominal force.

Maintaining balance on both legs was considered an easy task for the children, for which reason not all the subjects concentrated on it and after the first seconds they moved their watching direction, their head or even started to talk. When the SOL test was performed, a bigger effort was required in order to maintain balance for 30 seconds and consequently they concentrated more. Still, not all the subjects managed to maintain the leg raised during the entire test and they touched with the raised leg the board or the ground at least once.

The SBL test results, where $p > 0.05$ for all the parameters evaluated, indicate the fact that the differences between the initial and final measurements are not statistically significant. Still, after the intervention programme the length of the pressure centre (LCop) was shortened and the movement speed was lower in both tests. Also, the movement amplitude was lower, both in backwards-forwards plan and sideways. (Table 2). These results suggest that the subjects had better posture control even if the differences were not statistically significant. According to Usui et al. (1995), at the age of 6 the posture control has slower improvements and taking into consideration the fact that the intervention programme took place for only 4 weeks, it is possible that the application length may be too short.

At the SOL test, LCop was shorter after the intervention programme, at the initial measurement the mean being 155.04 cm and the final one 137.81 cm. Also, the VCop variable dropped between the two measurements from 5.16 cm/s to 4.60 cm/s. These results show the fact that the exercises performed during the intervention programme had a positive impact on the length and speed of the pressure centre (VCop) in the SOL test. Also, according to the data in Table 3, the amplitude of the pressure centre raised in backwards - forwards plan, even if these modifications were not significant from a statistical point of view. This thing may be explained by the fact that maintaining the balance at

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the age of the subjects is characteristic to adapting through strategies different from those of the adults, which lead to lack of consensus of the speed and amplitude during the movement of the pressure centre (Garcia et al., 2011; Ferronato & Barela, 2011; Verbecque et al., 2016).

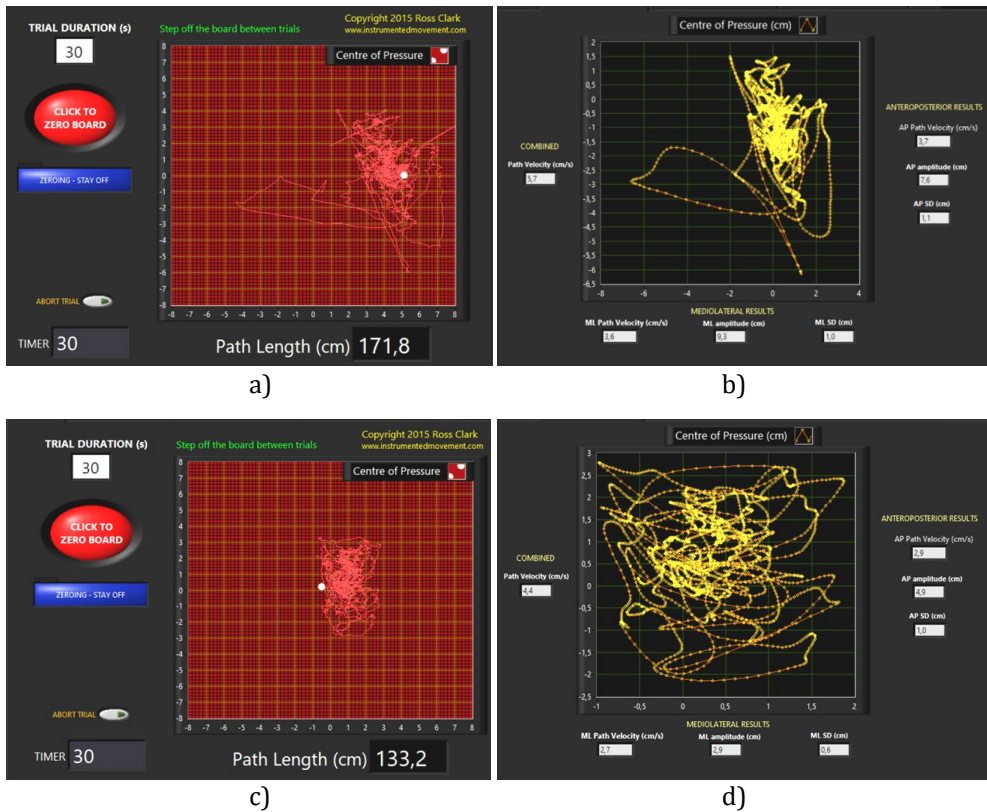


Figure 3. The SOL test parameters recorded using Wii Balance Board

Figure 3 confirms the facts previously stated, as it represents the recording of the balance parameters of one of the subjects, analysed with the Wii Balance Board in the SOL test. Images a) and b) represent the initial measurements (M1) and c) and d) the final ones.

CONCLUSIONS

After interpreting the data, one can conclude that the exercises practised during the intervention programme have contributed to the acquisition of the movements necessary for performing the tests which measure the motor skills. Also, we consider that the intervention programme had the appropriate dosage and complexity to influence the development of the explosive force of the lower limbs, of the coordination, flexibility and abdominal muscle force of the 6-9 year old girls, but we consider that a longer period of time is necessary in order to register higher progress.

The balance evaluation through the 4 parameters showed higher values at the end of the intervention programme, but these were not statistically significant. Although, according to the specialised literature the analysis of the movement of the pressure centre is meaningless when referring to children between 6 and 9, we consider that carrying out a research over a longer period of time and including a control group will eliminate all the variables appeared with the age and will help us verify if practising entertainment contemporary dance may influence posture maintaining at a lower school age.

With reference to the instruments used for measurements, we consider that they are efficient and easy to use for the researchers, being portable and low cost, as well as for the subjects, considering the fact that they did not meet major obstacles which should not be solved on the spot. It is recommended that 2 or 3 trials should be performed before measuring, in order to get used to the equipment.

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THE IMPACT OF THE COVID-19 PANDEMIC ON HUNGARIAN HEALTH TOURISM

Tamás NAGY^{1*}, Tamás LACZKÓ², Gábor László BÁTOR¹,
Barnabás EMÓDY¹

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ABSTRACT. Introduction: Health tourism is a key economic sector in Hungary, and its development and support has been a priority of the national economic development programmes since the millennium. Just like in the rest of the world, Hungary's tourism performed badly in the first year of the COVID-19. **Objective:** The objective of our study was to examine the main indicators of inbound health tourism to Hungary in the period of 2019-2020. Our main objective was to estimate the loss to the country's budget from declining inbound health tourism. **Methods:** The applied research method was secondary research, based on tourism demand data published by the Central Statistical Office (KSH). The national economic effects generated by the expenditure of foreign health tourists in Hungary were estimated using input-output analysis. **Results:** The number of foreign health tourists decreased to 46.4% compared to 2019, and the number of days spent by foreign health tourists decreased to 40.9% compared to the previous year. In the year of the pandemic, inbound health tourist spending generated total national output of €417 million, a decrease of more than 46% compared to the previous year. The contribution of inbound health tourism to GDP was €209.2 million, almost €160 million lower than in 2019. **Conclusion:** After a peak year in 2019, pandemic COVID-19 led to a significant drop in demand in the inbound health tourism market, which will also see a sectoral and territorial shift in 2020.

Keywords: *Health tourism, COVID-19, Macroeconomic impact, Hungary.*

¹ *Doctoral School of Health Sciences, Faculty of Health Sciences, University of Pécs, Pécs, Hungary*

² *Department of Health Promotion and Public Health, Faculty of Health Sciences, University of Pécs, Pécs, Hungary*

* *Corresponding author: nagy95tamas@gmail.com*

INTRODUCTION

Tourism is a key economic sector in Hungary, and its development and support has been a priority of the national economic development programmes since the millennium (MTÜ, 2017). The Hungarian tourism sector was on an almost constant dynamic growth path over the past 3 decades until 2019 (UNWTO, 2022). The tourism sector provided 7% of the Hungarian GDP and 10% of employment in 2019 (ÁSZ, 2021).

The 16.9 million visitors made Hungary the 11th most visited European destination in 2019. The number of tourists arriving in Hungary is significantly below the inbound tourism of popular countries such as France (nearly 91 million p.a.), Spain (81 million p.a.) or Turkey (51 million p.a.) but exceeds the performance of several countries with significant tourism (e.g., the UK or Romania) (Statista, 2022).

Health tourism is a significant segment of the tourism in Hungary (Gellai, 2004; Mundruczó, 2005; MTÜ, 2020). The development of health tourism has been a priority in all tourism development programmes since the mid-1970s (Boros et al., 2012, Laczkó, 2015). The conscious development of health tourism in Hungary has been justified and supported by a number of natural resources, health tourism traditions and consumer/market trends. Natural resources include natural healing factors such as thermal and medicinal water resources, medicinal mud, medicinal caves and climatic and thermal sites. Hungarian health tourism relies heavily on thermal and medicinal waters, of which Hungary has the fifth largest reserve in the world. Under the appr. 80% of Hungary's territory, significant quantities of water can be found with a temperature above 30 C and an excellent mineral composition, which facilitated the establishment of 473 spas in 2019 (KSH, 2022e). In addition to thermal water, the current development of Hungarian health tourism is supported by the professional experience of spa medicine, the reputation of spas with a centuries-old tradition, the competitive price/value market strategy and the significant development of the supply of spa and wellness tourism since the turn of the millennium (Aquaprofit, 2007; Laczkó & Ács 2009; Győri et al 2015, Győri 2020).

The role of health tourism in Hungary is well illustrated by the fact that there are more than 200 settlements in the country where health and/or wellness services and products play a significant role in tourism (Laczkó & Rébék, 2008; MTÜ, 2020). The special importance of health tourism is also shown by the fact that 5 of the TOP 10 Hungarian municipalities with the highest tourism turnover in 2019 have a health tourism profile, while the other 5 municipalities (e.g., Budapest, Szeged, Győr) also provide unique and significant health and wellness services (KSH, 2022a).

Settlement	Number of guest nights (thousand nights)		Share of foreigners
	All	Foreign	
Budapest	10 704	9 470	88%
Hévíz	1 144	675	59%
Hajdúszoboszló	980	369	38%
Balatonfüred	734	256	35%
Bük	723	416	58%
Siófok	695	233	34%
Zalakaros	669	161	24%
Sárvár	533	308	58%
Győr	453	240	53%
Szeged	441	147	33%

Fig. 1. Top 10 most visited places in Hungary in 2019 by number of guest nights
(Source: KSH, 2022a. Own editing)

Although several areas of wellness tourism (e.g., medical wellness tourism) have undergone significant developments and expansion in Hungary in the last two decades, the main attraction for inbound tourism is still the medical tourism. Among these, there is a strong international interest in dental treatments and spa and thermal spa services (Kincses et al., 2009; MTÜ, 2020; Laczkó, 2021).

A characteristic feature of foreign demand for health tourism, which has been constant for decades, is that it is highly spatially concentrated in Hungary (Ács & Laczkó, 2008; Csapó & Lőrincz, 2020). In summary, three tourism regions, West Transdanubia, Lake Balaton and Central Hungary (including Budapest), are the most popular areas among foreigners who are motivated by health tourism (Michalkó et al, 2011; MTÜ, 2020). This strong concentration is also reflected in the spatial distribution of foreign visitors to health resorts, as more than four-fifths of the number of guests (81.1%) and the number of guest nights (81.5%) was realized in these three regions in 2019 (KSH, 2020f).

COVID-19, which started in China in 2019, spread rapidly and became a pandemic by March 2020. In order to slow down the spread of the virus, countries introduced various restrictions, which hit the tourism sector very hard (Shretta, 2020; Raffay, 2020). UNWTO estimates that international tourism fell by around 1.1 billion, causing a loss of revenue of more than USD 820 billion for tourism worldwide, and 100-120 million workers lost their jobs as a result of the coronavirus pandemic (UNWTO, 2021; Ozili & Arun, 2020). International tourism has been the most drastically affected by the pandemic, as cross-border travel worldwide dropped by more than 70% compared to the pre-pandemic period (UNWTO, 2020).

Health tourism and wellness economy could not avoid the downturn, as reported by Global Wellness Institute (2021) report, and it also shows that wellness economy, which had exceeded the average global GDP growth until 2019, contracted by 11% in 2020 (GWI, 2021).

GWI estimates that the global wellness tourism market in 2020 was 39.5% lower than in 2019, while the value of the thermal and mineral springs sector was 38.9% lower than in 2019, and the value of the spa sector 38.6% lower. The revenues of the global medical tourism market were 40.0% below what had been expected before the coronavirus. Medical tourism in the US, the world's top revenue generator, fell by 49.4% in the first year of the pandemic (GWI, 2021; Research Dive, 2021; Fortune business insights, 2021).

Just like in the rest of the world, Hungary's tourism performed badly in the first year of the pandemic. The turnover of Hungarian accommodation establishments fell to 43.4% compared to the peak year of 2019, while the number of foreign visitors fell to 43.8% and the number of days spent in the country fell to 49.7% of the previous year. In addition to these negative developments in inbound tourism, the number of guest nights spent by foreigners in commercial accommodation in 2020 decreased by 76% compared to the previous year. Foreign tourist expenditure in Hungary fell by €3.8 billion in 2020 compared to €6.9 billion in 2019 (KSH, 2022d; KSH, 2022c).

Hungarian health tourism providers also experienced a significant decline. The number of pools, thermal and leisure spas operating in the country fell from 470 to 414, while the number of visitors to spas fell to 45.6% of the 2019 figure (KSH, 2022e). In 2020, the number of guests staying in hotels with spa hotel certification fell to 44.6% of the previous year's figure, the number of guest nights to 41.6% and revenues to 43.2% (KSH, 2022f).

OBJECTIVE

The objective of our study was to examine the main indicators of inbound health tourism to Hungary in the period of 2019-2020. We wanted to quantify the magnitude and dynamics of the change in the turnover and to estimate the impact on the national economy of the expenditure generated by foreign health tourists for both given years. Our main objective was to estimate the loss to the Hungarian economy caused by the pandemic and the decrease in inbound health tourism due to the restrictions imposed.

MATERIAL AND METHODS

In our study, we used the model developed by Smith and Puczkó (2014) to interpret and examine the complex field and terminology of health tourism. In their model, used as the conceptual background for our study, the spectrum of health tourism consists of wellness and health tourism, which are further subdivided into sub-domains based on the purpose of travel and the types of services (Figure no. 2).

Wellness			Medical	
Holistic	Leisure and Recreation	Medical wellness	Medical (therapical)	Medical (surgical)
Spiritual	Beauty Treatments	Therapeutic Recreation	Rehabilitation (illness related)	Cosmetic Surgery
Yoga and Meditation	Sport, fitness	Rehabilitation (lifestyle related)	Healing and Recuperation	Dentistry
New Age	Pampering	Occupational Wellness		Operations
			Thalassotherapy	
			Nutritional and Detox Programmes	

Fig. 2. The health tourism system
(Source: Smith & Puczkó, 2014)

According to their classification, wellness tourism includes trips with holistic, recreational, and medical wellness purposes. The two main forms of health tourism are identified as therapeutic and surgical/clinical. Clinical medical tourism always focuses on some form of surgery, whereas therapeutic tourism mainly includes healing treatments using natural healing agents (e.g., medicinal water, medicinal mud, medicinal caves, etc.) without surgical intervention. This division covers all areas of health tourism in which Hungary has a significant supply and turnover today (Smith & Puczkó, 2014; Gyóri et al., 2015; MTÜ, 2020).

During the data collection, KSH (Central Statistical Office) grouped foreigners arriving in Hungary for health tourism into the categories of health maintenance, medical treatment, medical treatment and dental treatment based on the primary motivation for their visit (KSH, 2022b). KSH groups of

travellers correspond well with the Smith and Puczko health tourism structures and definitions. Based on this, health tourists were classified as wellness tourists, health treatment tourists as therapeutic health tourists and medical and dental treatment tourists as clinical health tourists.

The applied research method was secondary research, based on tourism demand data published by the Central Statistical Office (KSH). The KSH data were obtained from the quarterly survey "Tourism and Other Expenditure of Foreigners in Hungary", which interviewed a total of 54,982 respondents in 2019 and 2020. The information was downloaded from the KSH information database (KSH, 2022b).

The total number of foreigners arriving for health tourism in the KSH data collection was 3,315 in the given two years, who are the sample group for our analysis. The group of health tourists was divided into four subgroups such as: motivated by health maintenance (wellness), therapeutic treatment, medical treatment, and dental treatment (clinical) (KSH, 2022b).

The national economic effects generated by the expenditure of foreign health tourists in Hungary were estimated using input-output analysis. Using information from the Sectoral Balances Approach (hereinafter SBA) and taking into account multiplicative effects, this method of analysis is increasingly used in the literature to estimate the macroeconomic effects generated by the expenditures of foreign visitors arriving for health maintenance (KPMG, 2015; Laczkó & Bánhidi, 2015; Laczkó & Stocker, 2020; Laczkó & Bátor, 2020). In tourism (such as health tourism) where foreign demand does not significantly exceed supply and economic capacity constraints for most of the year, the shortcomings of the input-output modelling are less of a problem in estimating the national economic impacts. The consumption of foreign health tourists does not represent the limitations of increased income leakage and one-sided interpretations of demand growth, the negative consequences of crowding out and substitution effects (Vörös & Kovács, 2020). In our study, we have focused mainly on multiplier effects, estimating the generated added value and the contribution to GDP, and have not examined areas such as employment, export generation or investment effects that are part of the Tourism Satellite Account system.

Based on the spending patterns of foreign visitors, we have defined the sectors concerned in line with the Sectoral Balances Approach (SBA). Based on the KSH data, we quantified the multiplier effect, value added and tax content, as well as the contribution to GDP of the sectors included in the analysis, based on the estimated SBA for 2015. The sectors analysed on the basis of consumption by foreign health tourists were:

- Human health care
- Sport, entertainment and leisure activities,
- Accommodation; restaurants,
- Food, beverages and tobacco
- Land transport, transport via pipelines
- Light industry.

In input-output modelling, a series of sequential steps can be used to estimate and quantify the economic impacts using the values of the SBA. In the modelling, the first step was to determine the net direct expenditure of foreigners arriving to enhance health tourism, from which the second step was to quantify the direct national economic impact of the expenditure by subtracting the import content. In the next step, we estimated the spill-over (indirect) economic effects of the expenditure of health tourists from abroad and the amount of direct and indirect value added generated, as well as the amount of tax revenue to the budget. Finally, we quantified the contribution of the expenditure to the GDP of Hungary, both directly and indirectly through spill-over effects.

Descriptive statistical methods are used to present the characteristics of the years and tourism areas examined in the study, while the dynamics and extent of change between periods are quantified using (dynamic) ratios.

RESULTS

Main characteristics of health tourism to Hungary in 2019 and 2020

In 2019, the peak year for Hungarian tourism, 16.9 million foreign tourists arrived in the country. Almost 3.6 million tourists, in other words 21.2% of foreign visitors to Hungary came for health tourism, spending 10.6 million days in the country. Foreign health tourists spent a total of more than 680 million euros in Hungary in 2019. The strong health tourism profile of Hungarian health tourism is illustrated by the fact that more than 70% of inbound health tourists came to the country to receive some kind of medical service or treatment. The largest number of visitors came for spa and thermal water-based services and treatments (spa treatments) (1.56 million), but it should also be noted that nearly one million visitors came to Hungary this year for dental and other medical procedures. Although the number of wellness tourists (health care) is far below the number of spa tourists, wellness facilities, which have been significantly improved since the turn of the millennium, still attracted more than one million visitors in 2019.

Dental tourism is one of the key sectors of Hungarian health tourism, which is one of the largest in the world (Bánhidi & Laczkó, 2015). Expenditure on dental treatment by foreign visitors accounts for almost a third of total expenditure on health tourism in Hungary. The spending tendency (226 Euro/day) of foreign visitors for dental treatments is much higher than that of other health tourists. In terms of total travel-related expenditure, besides dental visits, mainly thermal and spa treatments and wellness trips play the most important role in Hungarian health tourism.

Similar to inbound tourism as a whole, health tourism also shows a significant decline in the year of the pandemic: 2020. The number of health tourists fell to 46.4% compared to the revenue of 2019, while the number of days spent by them fell to 40.9% of the previous year. Significant differences were demonstrated regarding the decline in demand in different areas of Hungarian health tourism in 2020. The biggest decline was in wellness tourism, where both the number of guests and the number of days spent fell to 40% of the previous year. This decline showed a worse than average picture for inbound wellness tourism.

Table 1. Data on inbound health tourism to Hungary in 2019 and 2020

		Year	Number of visitors to Hungary (1000 pcs)	Days spent (1000 pcs)	Spending in total (million Euro)	Spending per day (Euro)
Wellness tourism		2019	1063	3849	205,23	53,32
		2020	435	1566	75,19	48,01
		2020/2019	40.92%	40.69%	36.64%	90.05%
Medical tourism	Treatment	2019	1562	5539	219,52	39,63
		2020	662	2180	114,59	52,56
		2020/2019	42.38%	39.36%	52.20%	132.62%
	Dental treatment	2019	838	1022	231,29	226,31
		2020	459	448	141,28	315,40
		2020/2019	54.77%	43.84%	61.09%	139.37%
	Surgery	2019	129	225	21,04	93,49
		2020	110	159	14,05	88,42
		2020/2019	85.27%	70.67%	66.78%	94.58%
	Medical tourism in total	2019	2529	6786	471.85	69.53
		2020	1231	2787	269.92	96.85
		2020/2019	48.68%	41.07%	57.21%	139.29%
Health tourism in total		2019	3592	10635	677,07	63,66
		2020	1666	4353	345,11	79,28
		2020/2019	46.38%	40.93%	50.97%	124.53%

In particular, there was a fall of less than 15% in the number of visits for medical treatment, and a smaller than average fall of 45% in the number of visits for dental treatment. As for visits for spa treatments, the decrease was similar to the average.

Foreigners' spending on health tourism in Hungary fell by 48.2% in 2020 compared to the previous year. There were also significant differences in spending regarding the types of visits. Concerning dental and medical treatments, the decline was much smaller than average, as illustrated by the fact that the total spending on these trips fell by "only" 37-31% in the year of the pandemic. This lower decline was explained by a smaller decrease in the number of arrivals for medical procedures and a significant increase in average spending for dental tourism in 2020. The wellness tourism sector also recorded the largest decline in travel-related expenditure (62.4%).

Macroeconomic impacts of health tourism expenditure in Hungary in 2019 and 2020

Macroeconomic impacts were quantified using input-output analysis, which was examined in the same way for both years. In the first step of the modelling, the direct expenditure of health tourists in Hungary was estimated in net terms. In 2019, the direct expenditure of health tourists arriving in Hungary was €548.3 million, which decreased by almost half to €273.7 million in 2020.

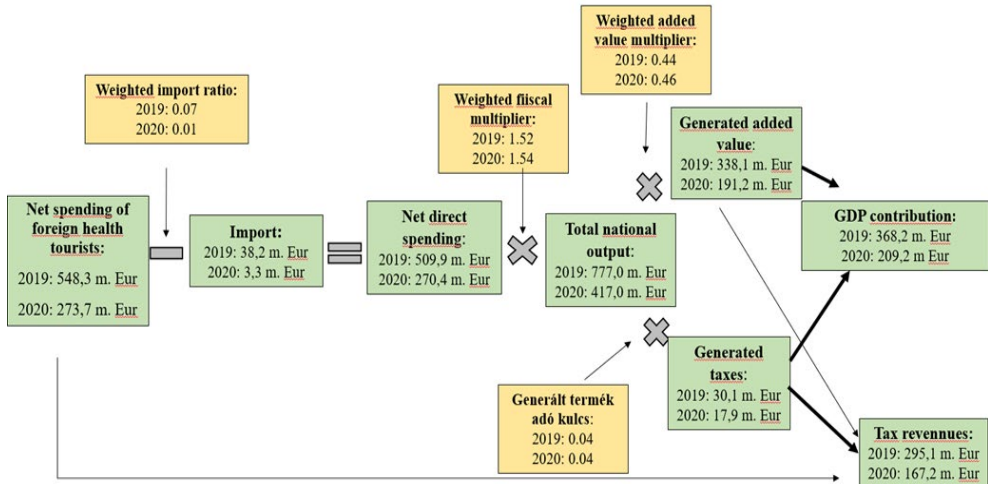


Fig. 3. Estimation of macroeconomic impacts generated by health tourist expenditure in Hungary using the input-output method (in 2019 and 2020, in millions of euros)

In the second step, after quantifying and subtracting the import content of direct expenditure, we estimated the size of the direct national economic impact. This amount was €509.9 million in 2019 and €270.4 million in 2020. In addition to the direct impact, we also quantified the indirect spill-over effects, taking into account multiplier effects, to estimate the total national economic impact generated by the expenditure of foreign health tourists. The overall weighted average multiplier coefficient for the sectors included in the analysis was 1.52 in 2019 and 1.54 in 2020. Based on these results, the total national output generated by inbound health tourism was €777.0 million in 2019, which decreased to €417.0 million in 2020. In 2019, the best year of inbound health tourism in Hungary, the spending of foreign health tourists generated €338.1 million in added value and €30.1 million in product taxes, which implies that the sector contributed €368.2 million to the Hungarian GDP. In the year of the pandemic, inbound health tourists' spending generated €191.2 million in added value, a decrease of more than 40% compared to the previous year. The contribution of inbound health tourism to GDP was €209.2 million, almost €160 million lower than in 2019.

Table 2. Macroeconomic impacts generated by the expenditure of health tourists in Hungary by type of visits in 2019 and 2020.

		Year	Direct expenditure (million Euro)	Total national output (million Euro)	Generated value added (million Euro)	Generated approximate GDP (million Euro)	Generated tax impact (million Euro)
Wellness tourism		2019	168,3	252,8	95,8	105,0	82,0
		2020	59,2	102,0	40,1	44,3	37,6
		2020/2019	35,18%	40,33%	41,83%	42,16%	45,79%
Medical tourism	Treatment	2019	181,2	271,5	111,8	122,1	93,1
		2020	92,2	148,7	58,8	64,6	56,0
		2020/2019	50,89%	54,79%	52,61%	52,90%	60,15%
	Dental treatment	2019	182,1	227,7	119,1	128,7	100,6
		2020	111,2	149,7	84,2	91,5	66,6
		2020/2019	61,09%	65,75%	70,73%	71,13%	66,21%
	Surgery	2019	16,6	25,1	11,5	12,6	10,2
		2020	11,1	16,5	8,0	8,8	6,9
		2020/2019	66,79%	65,83%	69,61%	69,62%	67,57%
	Medical tourism in total	2019	379,9	524,2	242,4	263,4	203,9
		2020	214,5	314,9	151,1	164,9	129,5
		2020/2019	56,47%	60,08%	62,32%	62,61%	63,51%
Health tourism in total		2019	548,2	777,1	338,2	368,4	285,9
		2020	273,7	416,9	191,1	209,2	167,0
		2020/2019	49,93%	53,65%	56,52%	56,78%	58,43%

Regarding the sectors of inbound health tourism, the contribution of health tourism to the Hungarian GDP is significantly higher than that of wellness tourism. In the year before the pandemic, health tourism accounted for 71.5% of the contribution of health tourism to GDP, while in 2020 it accounted for 78.8%. In terms of macroeconomic impacts generated by the spending of foreign health tourists, the role of dental treatments and medical treatments stands out. These two sectors accounted for more than two thirds (68.1%) of the total GDP generated by inbound health tourism in Hungary in 2019, while in 2020 they accounted for almost three quarters (74.6%).

The decline in the macroeconomic impacts due to the COVID-19 pandemic was also apparent in the macroeconomic impacts, but in general, the decline in the number of visitors and days spent was less than the decline in the generated economic impacts. The dental treatments, medical procedures and surgeries experienced the smallest decreases, both in terms of taxes and generated GDP. The largest decline appeared in wellness visits concerning all the studied macroeconomic impacts.

CONCLUSION

Health tourism has been a high priority area for the Hungarian tourism sector for several decades. Although the Hungarian health tourism sector, which is predominantly based on domestic resources, has seen an increase in domestic turnover in recent decades, health tourism is still a tourism sector in which foreign visitors play a particularly important role (Csapó & Lőrincz, 2020; KSH, 2022b).

The importance of foreign visitors in Hungarian health tourism is shown by the fact that the presence of foreign visitors in Hungarian health resorts is almost 50%, while the most popular five health tourism places (Hévíz, Hajdúszoboszló, Bük, Sárvár, Zalakaros) have a tendency to have a higher number of foreign guest nights than domestic ones year after year (KSH, 2022a).

Overall, more than one in every five foreigners came to Hungary in 2019 whose travel purpose was health tourism. According to KSH data, more than three and a half million foreigners travelled to Hungary for health and wellness tourism that year, staying in Hungary for a total of more than 10 million days, during which they spent more than 7 million guest nights. These foreigners stayed in Hungary for an average of 2.96 days, during which they spent an average of €64 per day. These figures represent a longer stay and a significantly higher spending tendency than the average foreign tourists (who stayed 2.26 days and spent €45 per day) (KSH, 2022b).

Following the peak year of 2019, the impact of the pandemic COVID-19 in the first third of 2020 also had a very strong impact on inbound tourism to Hungary. By 2020, the number of foreign tourists arriving in Hungary had fallen to 7.4 million, in other words 43.8% of the year before, and they spent half as many days (49.7%) in Hungary as in 2019 (UNWTO 2022; KSH 2022b). Although this decline is very significant, these figures are considered to be more favourable than the international average. UNWTO (World Tourism Organization) declared that the global tourism industry experienced its worst year on record in 2020, with the number of international tourists falling by 74% (UNWTO, 2022).

A similar decline to the average inbound tourism in Hungary was seen in health tourism in 2020. The number of inbound trips motivated by health tourism fell to 46.4% of the 2019 figure, while the number of days spent in Hungary fell to 40.9% of the previous year and total expenditure to 52.4%. It should be highlighted that different areas of health tourism were affected in very different levels by the pandemic-generated decline. Medical inbound tourism was the least affected, with all the parameters analysed (number of trips, guest days and expenditure) showing more favourable conditions than in the global medical tourism market and the average inbound tourism in Hungary. In terms of the number of trips and expenditure, dental tourism also showed a smaller decline than the average inbound tourism in Hungary. Regarding the economic impact of health tourism to Hungary it has to be pointed out that expenditure by foreign visitors on dental tourism fell by only 37.2% compared to pre-pandemic levels. Clearly inbound wellness tourism was defeated by the pandemic as it suffered a larger decline than the average for global markets in this sector and the average for inbound tourism in Hungary considering all parameters.

The total national output, generated by the direct expenditure by health tourists visiting Hungary, was €777 million in 2019, while in 2020 it fell by €339.2 million. Furthermore, tax revenues to the budget were €111.3 million lower in the same year than a year before.

Overall, the restrictions imposed by pandemic COVID-19 caused a significant drop in inbound health tourism to Hungary, resulting in a sector contribution by almost €149.6 million lower to the GDP of Hungary in 2020 than in 2019, which was a peak year.

Traffic data and macroeconomic studies confirmed that Hungarian inbound health tourism has a strong medical tourism profile. Among the Hungarian health tourism services, medical treatments and dental procedures are the most attractive to foreigners. It should be pointed out that the downturn caused by the pandemic has affected the medical tourism areas to a lesser extent, thus further enhancing the tourism and economic role of the area. In

2020, 78.8% of the GDP contribution of inbound health tourism to Hungary was generated by medical tourism. The results highlight the need to continue to prioritise clinical and therapeutic health tourism areas in inbound tourism products and destination development.

Experts in the field hope that, as the pandemic is tackled and economic and social life returns to normal, tourism will return to the pre-pandemic conditions, and thus, as in the period of economic crises, it will only be a temporary setback for Hungarian tourism. Tourism data for the year 2022 also point to a return to the pre-pandemic demands, as Hungarian tourism improves significantly compared to previous years and almost reaching the peak of 2019.

Positive expectations for Hungarian inbound tourism are significantly overshadowed by the negative impact on Hungarian inbound health tourism due to the unfolding war conflict after the pandemic subsided. Significantly higher energy prices and increased inflation have created very unfavourable operating conditions for health tourism. In addition, Russian and Ukrainian tourists, who are important inbound target groups for Hungarian health tourism, have practically been excluded from the market. In 2019, Russian health tourists spent 479,000 guest nights in Hungary, while Ukrainian visitors spent 25,000 guest nights. The drop-out of Russian visitors has had a particularly negative impact on Hévíz, the most popular Hungarian health tourism destination, which was the second most visited place after Budapest in the 2010s. Preliminary data for the year 2022 show that the pandemic and the war conflict have not only changed the proportions between the sectors of Hungarian health tourism, but have also partially altered the spatial structure of the turnover. Hungarian health tourism will also need a new strategy in terms of outbound markets if it intends to remain a competitive and significant destination for health tourism in Europe.

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RELATIONSHIP BETWEEN STRENGTH/POWER AND DYNAMIC BALANCE IN 1ST-YEAR UNDERGRADUATE STUDENTS – PILOT STUDY

Ioan Niculaie NEGRU^{1*}

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ABSTRACT. Aim: Examine the relationship between lower limb strength/power and dynamic balance, and whether lower limb strength differences influence balance. **Methods:** 85 subjects (mean age 20.14, ± 0.44) - female (n=63) and male (n=22) 1st-year undergraduate students - participated in this study. Standing long jump and single leg triple hop jump tests were used to determine strength/power, and balance board was used to determine balance. **Results:** The statistical analysis has revealed no statistically significant correlation between lower limb strength and the average time on balance board after three essays ($r = 0.102$, $df = 83$, $p = 0.35$). As for the relationship between the difference in the scores of the three successive single leg hop jumps and the average time on balance board after three essays, no statistically significant correlation has been found in this case either ($r = 0.136$, $df = 83$, $p = 0.21$). The average score of hop jumps on right leg is ($M = 412.54$ cm) and the average score of hop jumps on left leg is ($M = 403.07$ cm); according to the statistical analysis, they differ significantly ($t = 2.227$, $df = 84$, $p = 0.029$). There is a significant difference ($t = -2.625$, $df = 84$, $p = 0.01$) between the average time on balance board after the first essay ($M = 24.77$) and the average time on balance board after the third essay ($M = 27.21$). **Conclusions:** In this study, the statistical analysis has revealed no statistically significant correlation between lower limb strength/power and balance. No statistically significant correlation has been found between lower limb strength difference and balance either. Balance board is important in balance development, as shown by the average scores of the three essays ($M1 = 24.77$, $M2 = 26.52$, $M3 = 27.21$).

Keywords: strength/power, dynamic balance, balance board.

¹ Babeş-Bolyai University, Cluj-Napoca, Romania

* Corresponding author: ioan.negru@ubbcluj.ro

REZUMAT. Relația dintre forță/putere și echilibrul dinamic la nivelul studenților de anul I - studiu pilot. Obiective: Analiza relației dintre forța/puterea membrelor inferioare și echilibrul dinamic, precum și dacă diferența de forță, la nivelul membrelor inferioare, influențează echilibrul. **Metode:** La studiu au participat 85 de subiecți (vârsta medie 20.14, ± 0.44), fete (n=63) băieți (n=22) studenți, în anul I. Pentru determinarea forței/puterii s-au folosit testele săritura în lungime de pe loc și tripla săritură pe un membru inferior, iar pentru determinarea echilibrului s-a folosit placa de echilibru. **Rezultate:** În urma analizei statistice, nu s-a obținut o corelație statistică semnificativă între forța membrelor inferioare și media timpilor celor trei încercări realizate pe placa de echilibru ($r = 0.102$, $df = 83$, $p = 0.35$). În ceea ce privește relația dintre diferența valorilor obținute la cele trei sărituri succesive pe un singur membru inferior și media timpilor celor trei încercări, pe placa de echilibru, nici în acest caz nu s-a obținut o corelație statistică semnificativă ($r = 0.136$, $df = 83$, $p = 0.21$). Media săriturilor pe membrul inferior drept a fost ($M = 412.54$ cm), pe cel stâng ($M = 403.07$ cm), iar conform analizei statistice, ele diferă semnificativ ($t = 2.227$, $df = 84$, $p = 0.029$). Între media timpilor obținuți la prima încercare pe placa de echilibru ($M = 24.77$) și media timpilor obținuți la a treia încercare pe placa de echilibru ($M = 27.21$) există o diferență semnificativă ($t = -2.625$, $df = 84$, $p = 0.01$). **Concluzii:** În acest studiu analiza statistică nu a scos în evidență o corelație statistică semnificativă între forța/puterea membrelor inferioare și echilibru. De asemenea, nu s-a găsit o corelație statistică semnificativă între diferența de forță la nivelul membrelor inferioare și echilibru. Placa de echilibru este importantă în dezvoltarea echilibrului, acest aspect fiind evidențiat prin mediile celor trei încercări ($M1 = 24.77$, $M2 = 26.52$, $M3 = 27.21$).

Cuvinte cheie: forță/putere, echilibru dinamic, placa de echilibru.

INTRODUCTION

Balance is defined as quick postural adaptation against changes in the centre of gravity at the time of activity (Gürkan et al., 2016). Highly developed strength and good ability of body rebalancing after certain movements have an influence on athletic performance, everyday physical activities, while reducing injuries (Bhat & Jamal, 2013; Muehlbauer et al., 2015). The risk of injury, particularly ankle injury, is higher in those with poor balance ability (Bhat & Jamal, 2013). Low strength/power/balance increases the risk of falling in old adults (Muehlbauer et al., 2012). Differences in lower-limb strength development can also lead to injuries. This asymmetric development is usually found in sport games. Reducing this asymmetry can have a positive influence on sport performance (Barrera-Domínguez, et al., 2021).

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In high-performance sport, at the beginning of the training season, it is important determine, through tests, the level of strength/power/balance development and the relationship between them so as to define the training priorities based on those results (Hammami et al., 2016).

MATERIAL AND METHODS

The study was conducted based on a protocol that had been read and accepted by the students. The study used tests to determine lower limb strength/power, i.e. standing long jump and triple hop jump, performed from a standing position, on the same leg – first on the right leg and then, after rest, on the left leg. Swinging of arms during jumps was allowed. Balance board and stopwatch were used to determine the level of dynamic balance. The subjects had three essays in this test. If they reached 30 seconds without the ends of the board touching the ground, the subjects were stopped. The average time on balance board after the three essays was calculated at the end.

85 subjects (mean age 20.14, ± 0.44) – female (n=63) and male (n=22) 1st-year undergraduate students not involved in high-performance sport – participated in this study.

SPSS (version 19) was used for statistical data analysis. A paired sample t - Test was used for comparing the outcomes on balance board. The p value used in this study was $p \leq 0.05$.

RESULTS

The first test was standing long jump and the scores are shown in the table below (Table 1).

Table 1. Standing long jump scores

N	Valid	85
	Missing	0
Mean		163.67
Median		158.00
Std. Deviation		33.919

The table below shows the scores of successive hop jumps, performed from a standing position, first on right leg (M = 412.54 cm), and then on left leg (M = 403.07 cm) (Table 2).

Table 2. Scores of hop jumps, performed from a standing position, first on right leg, then on left leg

	Mean	N	Std. Deviation	Std. Error Mean
3 Hop jump on right leg	412.54	85	92.725	10.057
3 Hop jump on left leg	403.07	85	99.708	10.815

The average score of hop jumps on right leg is (M = 412.54, st. dev. = 92.72), the average score of hop jumps on left leg is (M = 403.07, st. dev. = 99.70); according to the statistical analysis, they differ significantly (t = 2.227, df = 84, p = 0.029) (Table 3).

Table 3. Difference between average score of hop jumps on right leg and average score of hop jumps on left leg

	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
3 Hop jump on right leg	9.471	39.205	4.252	2.2	84	.029
3 Hop jump on left leg				27		

The table below shows the average time on balance board after three essays (Table 4).

Table 4. Average time on balance board after three essays

	Statistic	
	Valid	Std. Error
N	85	0
	Missing	0
Mean	26.1707	.7310
Median	30.0000	.2463
Std. Deviation	6.70076	.86600

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The statistical analysis has revealed no correlation between lower limb strength and average time on balance board after 3 essays ($r = 0.102$, $df = 83$, $p = 0.35$) (Table 5).

Table 5. Correlation between standing long jump and average time on balance board after three essays

		Standing long jump	Average time on balance board after 3 essays
Standing long jump	Pearson Correlation	1	.102
	Sig. (2-tailed)		.352
	N	85	85
Average time on balance board after 3 essays	Pearson Correlation	.102	1
	Sig. (2-tailed)	.352	
	N	85	85

As regards the relationship between the difference in the scores of the three successive single leg hop jumps (first on right leg, then on left leg) and the average time on balance board after three essays, no statistical correlation has been revealed in this case either ($r = 0.136$, $df = 83$, $p = 0.21$) (Table 6).

Table 6. Correlation between difference in scores of hop jumps on right leg and on left leg and average time on balance board after three essays

		Difference between jumps scores	Average time on balance board after 3 essays
Difference between jumps scores	Pearson Correlation	1	.136
	Sig. (2-tailed)		.213
	N	85	85
Average time on balance board after 3 essays	Pearson Correlation	.136	1
	Sig. (2-tailed)	.213	
	N	85	85

There is a statistically significant difference between the average time on balance board after the first essay ($M = 24.77$, $st. dev. = 9.71$) and the average time on balance board after the third essay ($M = 27.21$, $st. dev. = 7.04$) ($t = -2.625$, $df = 84$, $p = 0.01$) (Table 7).

Table 7. Difference between average time on balance board after one essay and average time on balance board after three essays

	Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2-tailed)
Time 1 on balance board	-2.43647	8.55657	.92809	-2.625	84	.010
Time 3 on balance board						

DISCUSSIONS

In their study, Hammami et al., (2016) found correlations between spinal extensor strength and balance, and between lower limb strength (standing long jump/countermovement jump/3 - hop jump test) and balance.

In another study conducted by Muehlbauer et al. (2012), no significant associations were found between strength/power and balance.

In our study, a significant difference has been found in lower limb strength/power, and the recommendation would be that in the future subjects pay attention to improving the strength/power of their weaker lower limb.

Some studies point out that asymmetric development of lower limb strength is associated with injury (Barrera-Domínguez et al., 2021).

CONCLUSIONS

In this study, the statistical analysis has revealed no statistical correlation between lower limb strength/power and balance. No statistical correlation has been found between the difference in lower limb strength and the time on balance board either.

The statistical analysis has revealed that the subjects' right lower limb is stronger than their left lower limb, and the recommendation would be for them to pay more attention to developing strength in their weaker lower limb so as to prevent injuries during physical/sport activities.

Balance board is important in balance development, as shown by the average scores of the three essays. There is an evolution in the subjects' ability to keep their balance from the first essay to the third one. (M1 = 24.77, M2 = 26.52, M3 = 27.21).

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EARLY MOBILIZATION AND THE ELASTIC BAND, AN EFFICIENT SOLUTION FOR AN INTUBATED SUBJECT: A CASE STUDY

Delia-Claudia STAN^{1*}, Iosif SANDOR²

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ABSTRACT. Introduction: In severely ill patients, weakness acquired in the intensive care unit is a frequent consequence. The advantages of early mobilization for adult intensive care unit patients include shorter stays in the intensive care unit and hospitals, a shorter need for mechanical ventilation, fewer days of harmful bedrest, fewer negative or dangerous occurrences, and increased walking distance. Early mobilization and rehabilitation programs using elastic bands for patients with severe illnesses in intensive care units enhance the weaning success and shorten ventilation times while also enhancing arm muscular power. **Objective:** This study case aimed to present the fact that early mobilization and elastic band exercises were efficient solutions for an intubated subject from the intensive care unit. **Methods:** A mechanically ventilated subject postoperatively for hiatal hernia and suspected phrenic nerve paresis, benefited from early mobilization and elastic band exercises and was assessed for the state of consciousness with the Richmond Agitation Scale, and muscle strength for the upper limb with the EH101 digital dynamometer. **Results:** Muscle strength at the level of the upper limbs increased from weak to normal and the subject was successfully extubated. **Conclusions:** In this case study we consider that early mobilization and the elastic band exercises program were effective, safe, inexpensive, and suitable for an intensive care unit, and it was the right solution for the success of weaning from the ventilator.

Keywords: *early mobilization, elastic band, handgrip, ventilated subject, intensive care unit.*

¹ PhD student, Doctoral school, Faculty of Physical Education and Sport, Babeş-Bolyai University, Cluj-Napoca, Romania

² Faculty of Physical Education and Sport, Babeş-Bolyai University, Cluj-Napoca, Romania

* Corresponding author: delia.stan@ubbcluj.ro

REZUMAT. Mobilizarea precoce și banda elastică, o soluție eficientă pentru un subiect intubat: studiu de caz. Introducere: Slăbiciunea musculară dobândită în unitatea de terapie intensivă este o complicație frecventă la subiecții în stare critică. Beneficiile mobilizării precoce sunt: durata redusă în unitatea de terapie intensivă și a spitalizării, a ventilației mecanice, a zilelor de repaus la pat, efecte adverse minime și o distanță parcursă la mers mai mare. Mobilizarea precoce și exercițiile cu banda elastică îmbunătățesc succesul extubării subiecților și reduc durata ventilației mecanice, de asemenea îmbunătățesc forța musculară la nivelul membrelor superioare. **Obiective:** Obiectivul acestui studiu de caz a fost, de a prezenta faptul că, mobilizarea precoce și exercițiile cu banda elastică au fost soluții eficiente pentru un subiect intubat din secția de terapie intensivă. **Metode:** Un subiect ventilat mecanic post-operator pentru hernie hiatală și suspect de pareza de nerv frenic a beneficiat de mobilizare precoce și exerciții cu banda elastică, fiind evaluat pentru starea de conștientă cu Richmand Agitation Scale și forța musculară pentru membrele superioare cu dinamometrul digital EH101. **Rezultate:** Forța musculară la nivelul membrelor superioare a crescut de la nivel slab la normal iar subiectul a fost extubat cu succes. **Concluzii:** În acest studiu de caz considerăm că, mobilizarea precoce și programul de exerciții cu bandă elastică au fost eficiente, sigure, necostisitoare și potrivite pentru o unitate de terapie intensivă, si a fost soluția potrivită pentru succesul extubării subiectului.

Cuvinte cheie: mobilizare precoce, bandă elastică, dinamometru digital, subiect ventilat, unitate de terapie intensivă.

INTRODUCTION

Every year, between 13 and 20 million individuals around the world need treatment in intensive care units (Wang, T., 2020). Subjects who have been on mechanical breathing for longer than 48 hours experience rapid skeletal muscle atrophy (Hodgson, C. L., et al., 2022). The muscle force decreases by about 20–27% after two weeks of immobility, making it harder to wean off of ventilatory support and causing functional loss (Skals, S., 2018). A combination of muscle and nerve injuries that developed during an intensive care unit stay in 25% to 63% of mechanically ventilated participants is what causes intensive care unit-acquired muscle weakness (Cottreau, G., et al., 2021). Muscle weakness acquired in the intensive care unit is a common complication affecting critically ill subjects' prognosis. The hand-held dynamometer was found to be sensitive in detecting muscle strength reduction in the critically ill (Samosawala, N. R., Vaishali, K., & Kalyana, B. C., 2016).

According to some data, starting rehabilitation two or three days after being admitted to an intensive care unit may be preferable to starting it later (Hodgson, C. L., et al., 2021). The advantages of early mobilization in the intensive care unit include shorter intensive care unit and hospital stays, shorter periods of mechanical ventilation, fewer days of harmful bedrest, fewer negative or dangerous occurrences, and increased walking distance (Perme, C., et al., 2014). Additionally, early mobilization offers many advantages, such as enhanced perfusion, muscle strength, and functional capacity (Decha, P., et al., 2020).

The handgrip can reveal limb weakness and reveal whether a patient is dependent on a ventilator or may struggle to wean off one (Wang, T., 2020). Using a dynamometer to determine the greatest static force that a hand can squeeze, handgrip strength is an established, non-invasive, and practical bedside approach for the assessment of muscular strength in clinical practice (Pucci, G., et al., 2022). By using a straightforward handhold command without the need for specific equipment, handgrip strength looks to be a simple, quick technique to assess expiratory muscular strength. Strong handholds might be related to powerful expiratory muscles. (Grigoriadis, K., et al., 2022). The participant's highest voluntary effort is recorded by the grip dynamometer (Paramasivan, M., et al., 2019). The participant's highest voluntary effort is recorded by the grip dynamometer. (Lupton-Smith, A., et al., 2022). The EH101 dynamometer offers outstanding validity and dependability (Huang, L., et al., 2022). In mechanically ventilated patients, handgrip strength can predict whether weaning will be challenging or take a long time. Low strength was associated with a considerably higher reintubation rate (Saiphoklang, N., & Keawon, T., 2021).

Elastic resistance bands are a great cheaper alternative to other pricey equipment because they appear to be a genuine and trustworthy tool for the direct measurement of maximum muscle strength and endurance (Haraldsson, B.T., et al., 2021). The weaning rate can be increased by 78% using elastic band resistance training, which is simple to learn and does not have any physical space restrictions. This is especially true for people requiring mechanical ventilation (Chang, Y. J., 2020). It is quite enticing to use elastic band workouts as a cheap, straightforward technique in a "protected environment" like the intensive care unit (Aboodarda, S. J., Page, P. A., & Behm, D. G., 2016). An acceptable, safe, and effective therapeutic approach to retain remaining upper limb motor activities and enhance trunk control was an elastic band exercise program in a critically sick patient recovering from intensive care unit-acquired weakness (Polastri, M., et al., 2018). Elastic band exercise is a fascinating technique since it is helpful for maintaining muscle mass and enhancing muscle strength in a variety of medical problems (Skals, S., 2018). According to Decha P., et al., 2020, rehabilitation programs for critical illness in the intensive care unit that include

early mobilization with elastic band exercises increase weaning success and shorten ventilation duration while also enhancing arm muscular strength. Due to the motor supply to the primary respiratory muscles of the diaphragm, phrenic nerve injury can cause transient dyspnea, diaphragmatic paralysis, and gradually decrease respiratory function (Lee, J.H., et., al. 2021).

CASE DESCRIPTION

Subject History

The subject described in this case report was a 65-year-old man admitted to the post-operative intensive care unit with a diagnosis of axial hiatal hernia, for which the hiatal hernia was treated. Relatedly, the subject has a coronary disease, a triple aortocoronary bypass in 2010, old previous myocardial infarction, degenerative mitral regurgitation, mild tricuspid insufficiency, atrial fibrillation converted to sinus rhythm by medication in 2010, New York Heart Association II, heart failure, ankylosing spondylitis. The subject has a deformed, kyphoscoliosis chest and a postoperative scar at the chest level. On admission, the subject is sedated, with a Richmond Agitation Scale score of -3 points. From a respiratory point of view, the subject, orotracheal intubated and mechanically ventilated. The sedation window was performed for neurological evaluation, with respiratory and ventilatory parameters within normal limits. Was safely extubated, but shortly after extubation, the subject complains of dyspnea, and becomes tachypneic, and polygenic, with increased respiratory effort with the activation of accessory muscles, with hemodynamic impact and developing respiratory acidosis, followed by neurological alteration, which is why reintubate, with monitoring of ventilatory parameters. A decrease in the function of the diaphragm was suspected in the context of the subject's pathology and the surgical intervention that occurred. In this sense, physical therapy intervention was considered necessary for weaning from the ventilatory. On the fourth day of the intensive care unit, the decision was made to extubate the subject with non-invasive ventilation and physical therapy. He remains extubated for four days, after which the subject progressively changes, shows respiratory acidosis with increasing dioxide carbon, and is reintubated. A neurological consultation is requested, what does he recommend for a brain magnetic resonance imaging examination. A rheumatological consultation is also carried out, which concludes that ankylosing spondylitis does not per se, cause diaphragm dysfunction. Abdominal ultrasound detects the mobility of the right hemidiaphragm within normal limits, with very low mobility of the left hemidiaphragm, so the suspicion

of left phrenic nerve paresis is raised, with the mention that the phrenic nerve paralysis/injury cannot be objectified on the territory of our country, due to the lack of logistics. The subject was conscious and cooperative, but respiratory and hemodynamically unstable. With the consent of the subject, a tracheostomy was performed on the fifteenth day of the intensive care unit.

OBJECTIVE

The aim of this study case was to present the fact that early mobilization and elastic band exercises were solutions for an intubated subject from the intensive care unit.

MATERIAL AND METHOD

The case study was conducted in the Intensive Care Unit of Cluj-Napoca “The Regional Institute of Gastroenterology and Hepatology Prof. Dr. Octavian Fodor”, from September to October 2022, to present the fact that early mobilization and elastic band exercises were solutions for an intubated subject from the intensive care unit.

The procedure was explained to the subject, and informed consent was signed. The baseline data was noted before starting the protocol.

The subject’s state of consciousness was assessed with the Richmond Agitation Scale (RASS) to describe his level of alertness, agitation, and sedation. This scale ranged from -5 to +4 which means: with a score of 0 to +4 the subject is alert, restless, or agitated (Sessler et al., 2002). In our case, the subject has 0, which means he was awake, alert, and calm.

Muscle force of the upper limb was tested with an electronic hand dynamometer EH101, which is one of the latest released products. High-precision power gauging, giving momentary digital read-out of gripping power. Auto capturing of maximum achieved grip power and display value. Assessment of results according to age and gender group - weak/normal/strong, provides gripping up to 90 kg. The digital handgrip dynamometer EH101 is a valid tool for assessing grip strength in hospitalized adult patients (Lupton-Smith, A., et al., 2022). The EH101 dynamometer provides excellent reliability and validity (Huang, L., et al., 2022). The indication for the subject was to use the dominant hand and was asked to squeeze the handle with maximal effort, three times and the best result was registered. Upper limb exercises were performed using an elastic band, a blue band with reduced resistance of 2 kg.

The subject has 37 days in the intensive care unit and 30 days of physical therapy. He has had one session of physical therapy per day from Monday to Friday and two times on Saturday too since the first day of intensive care.

Intervention

Below, in the table is the description of the physical therapy program by day.

Table 1. The schedule of the physical therapy program by day

Physical therapy/ Day	Assessment	Exercise/ Exercise with an elastic band	Transfer/ Gait
1	Clinical: Subject intubated, conscious, cooperative Informed consent signed Richmond Agitation Scale 0 The handgrip of the upper limbs was 27.6kg - weak At the level of the cervical spine, welding of the vertebrae with the impossibility of flexion, extension, rotation, or tilting of the head	Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions	Transfer to the edge of the bed, standing, steps next to the bed
2 - 3		Global analytical exercise, 10 repetitions in dorsal decubitus Diaphragmatic breathing exercise, 10 repetitions For the upper part specific exercise with the elastic band (2kg - of resistance) in bed, 10 repetition	Transfer to the edge of the bed, standing, steps next to the bed, armchair - 2 hours
4	The subject was extubated with high oxygen flow	Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions For the upper part specific exercise with the elastic band in the armchair, 10 repetition	Transfer to the edge of the bed, standing, steps next to the bed, armchair- 3 hours

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Physical therapy/ Day	Assessment	Exercise/ Exercise with an elastic band	Transfer/ Gait
5	The subject was reintubated	Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions Exercise with the elastic band in bed, 5 repetitions	
6 - 7		Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions at the edge of the bed For the upper part specific exercise with the elastic band in the armchair, 10 repetition/2 series	Transfer to the edge of the bed, standing, steps next to the bed, armchair- 3 hours
8	Premiere	Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions at the edge of the bed For the upper part specific exercise with the elastic band at the edge of the bed, 10 repetition	Transfer to the edge of the bed, standing, steps next to the bed Walked intubated more than 25 meters
9		Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions in bed For the upper part specific exercise with the elastic band in bed, 10 repetition/2 series	Transfer to the edge of the bed, standing, steps next to the bed Walked intubated more than 30 meters Armchair 1 hour
10	Handgrip 32,8 kg - normal	Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions in bed For the upper part specific exercise with the elastic band in bed, 10 repetition/ 2 series	Transfer to the edge of the bed, standing, steps next to the bed Walked intubated more than 30 meters Armchair 2 hours

Physical therapy/ Day	Assessment	Exercise/ Exercise with an elastic band	Transfer/ Gait
11 - 12		Global analytical exercise, 10 repetitions in bed Diaphragmatic breathing exercise, 10 repetitions in bed For the upper part specific exercise with the elastic band in bed, 10 repetition/2 series	Transfer to the edge of the bed, standing, steps next to the bed Walked intubated more than 30 meters Armchair 2 hours
13 - 27	Tracheostomy Progressive weaning from the ventilator	I continued the therapeutic program adjusting the dosage of the exercises according to the clinical condition of the subject	
28 - 30	Ventilator weaning Handgrip 31,7 kg - normal	I continued the therapeutic program adjusting the dosage of the exercises according to the clinical condition of the subject	Walked without supplemental oxygen

RESULTS

The purpose of this case study was to present the fact that early mobilization and elastic band exercises were efficient solutions for an intubated subject from the intensive care unit. The subject was independent with all functional mobility before his hospitalization, and we managed to keep it. In this study case, the subject has Richmond Agitation Scale 0, which means he was awake, alert, and calm during the whole physical therapy program. He was very cooperative and compliant with the physical therapy program. The communication was greatly facilitated by the fact that the subject was using a smartphone. In this sense, we could start a physical therapy program as soon as the hemodynamic parameters allowed us, and this was since the first day. At the initial evaluation of the muscle force of the upper limb with the dynamometer EH101, the result was 27,6 kg which means weak, after ten days of the physical therapy program we obtained a normal force of 32,8 kg, and the muscle force of the upper limb raised with 5,2 kg. Although at the end of the 30 days of physical therapy, the muscle force of the upper limb tested with the handgrip was a little smaller 31,7 kg. During the 30 days of the physical therapy program, our subject had a lot of difficult periods with hemodynamic and respiratory instability and other complications due to the intensive care unit.

The subject was very cooperative and compliant and with a great communication, we succeed the performance of walking more than one hundred steps with the mechanical ventilation device while the subject was intubated. This was a very important aspect for our intensive care unit because it was the first time when an intubated and mechanically ventilated subject was walking in these conditions. This thing was another important aspect that contributed to the success of weaning from the ventilator in the end. The physical therapy program, the compliance of the subject, and teamwork contributed to the success of weaning from the ventilator.

CONCLUSIONS

In this case study we consider that early mobilization and the elastic band exercises program were effective, safe, inexpensive, and suitable for an intensive care unit, and it was the right solution for the success of weaning from the ventilator.

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THE ROLE OF COACHES AND PARENTS IN YOUTH FOOTBALL TRAINING

János TÓTH Jr.^{1*}, Simon BALÁZS¹

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ABSTRACT. Our topic is the investigation of the influence of parents and coaches of youth soccer children on the children's sports performance, what is the role of coaches in teams of different youth age groups (according to the physiological effects of children), the relationship between coaches and parents, the relationship between coaches and players, the control and development of the most talented players. With our chosen topic, we set myself the goal of examining whether the support and help of parents or coaches has a greater effect on the child's sports performance. We chose this topic because we would like to help during the coaching career in the future, and we also consider it important to develop the skills of young Hungarian football talents, in which parents and coaches have an important and outstanding role. In our article, we would like to reveal what are the outstanding factors that most influence a player's performance on the field, and to what extent coaches and parents contribute to this. We think that it is important for both sides to see their role in the development of football talent. We would also like to examine to what extent parents contribute to the advancement of their child's soccer career, whether they recognize the factors in which they should help their child progress in soccer. After all, in our opinion, without parental support, it will be more difficult for the player to progress, who will also be more balanced emotionally, which also has a significant impact on his sports performance, if the parent monitors and encourages him during his football career. Do soccer coaches consider their relationship with their students important? What is the role of football coaches in the different youth age groups, what is the focus? To what extent does the role and education of parents influence their children's performance, football coaches, how can they cooperate with parents and players? How can football coaches keep under control and develop the most talented child?

Keywords: *upbringing, education, talent.*

¹ *Hungarian University of Sports Science, Budapest, Hungary*

* *Corresponding author: toth.janos@tf.hu*

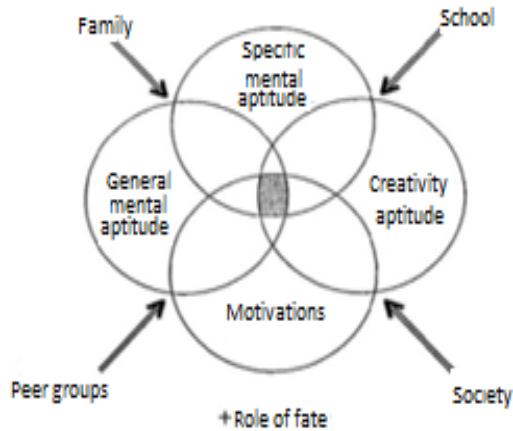
INTRODUCTION

“The teacher’s belief in the power of education often helps him through the deadlock in the practice of his profession. The coach’s educational work is directly affected by how he thinks about the issues of educational opportunities” (Gombocz, 2008).

It is well known that all sports are based on training young people to the right level (Németh, 2011). According to our experience, the coach can be considered a key figure in the triad of cooperation between coach, student and parent. The person of the coach can be a milestone in the child’s personality development. He proved that the behavior of the coach and his relationship with the athlete are of paramount importance in terms of the development of talent. Today’s young children are different, their expectations are different. The players expect good preparation, it is important for them that their training sessions are planned and varied, the coach must pay attention to every little part so that the children develop at a suitable pace according to their physiological abilities (Power, 2020). Only 30% of coaches mentioned physical abilities as a condition for talent development and success (Orosz & Bíró, 2009).

Talent: we do not consider it a permanent personality trait, but rather a phenomenon determined by several external and internal factors. A person is talented who has the physical and psychological characteristics and conditions appropriate to the given age stage, these factors can make a high level of performance in the chosen sport more likely (Orosz & Bíró, 2009). According to Endre Czeizel’s 2X4+1 factor talent model, inherited and environmental components play a role in the emergence of talent. The model attributes a key role in the realization of talent to four individual and social-environmental factors. Among the factors within the individual, he considers general mental aptitude, specific mental aptitude, creativity and motivation to be important. In the case of social environmental factors, he highlights the role of family, peer, and school influences (coaches in sports), as well as the role of fate.

From the point of view of conscious career building, the sense of responsibility among footballers is important. Szabó and Kékesi (2016) mentions three different levels in their concentric model of responsibility: the micro-level refers to the individual’s sense of responsibility with himself, the meso-level with his immediate social environment, and the macro-level with his wider environment. Sportsmanship is manifested in many behaviors, both on and off the sports field. A young player or child goes to training regularly, follows the coach’s instructions and makes efforts for his development (Szántai & Szabó, 2021).



Graph 1. Hungarian talent management company, 2015

The coach can continuously help and shape the relationship between parent and athlete. The development of a child's talents is significantly influenced by his upbringing and education, which begins in the first educational arena, the family, in the period before school age. Children's mental health is extremely important, as it affects children's performance on and off the field (Simpson, 2020). Soccer as a team sport for the greater development of cognitive abilities and reactive behavior (Szántai et al., 2022). According to Van Rossum, the responsibilities of the family are: financial support, adapting the organization of the household to the athlete's schedule, moral support and general commitment, organizing travel to training sessions and matches, help with problems (for example in case of injuries), support for matches (Orosz & Bíró, 2009).

Family influences in the development of sports talent

The family is the primary and most important scene of socialization, from where our basic values, beliefs, communication and behavior patterns come. The family not only provides the individual with information about getting to know the outside world, but also has a significant impact on his set of concepts related to himself (self-concept). In the sensitive period of concept acquisition (in the first years of childhood), feedback from the immediate environment can very intensively shape a person's knowledge about himself. The family thus plays a primary role in the formation of self-image and identity. Success in sports can have an important impact on the extent to which someone is able to believe in

their success, in winning, in being able to achieve their goals. Baumann's (2002) idea is also related to deep-seated family experiences, according to which the Eriksonian trust in parental influences that develops in infancy can be a precursor to self-confidence in sports. The quality of family socialization (for example, the acquisition of appropriate communication and conflict management patterns) can determine later social relationships, such as integration into the community or communication with an authority figure, which can also be an important factor in career building in team sports. According to Budavári (2007), parental ambitions can affect the child's motivation. Frustrated in their desire to excel, parents expect their children to fulfill their own dreams. If the parent's desire to achieve is stronger than the child's, it usually results in the interruption of the sports career. At the same time, parental sacrifice and support can be a central factor in the fulfillment of talent. According to Van Rossum (1995), parental support plays a very significant role not only in the first two phases of an athlete's career, but also in the third phase. He singled out six important factors in which family support appears even in the perfection phase:

- moral support and general commitment
- adapting the organization of the household to the athlete's schedule
- financial support
- organizing travel to training sessions and matches
- help with problems (for example, in case of injuries)
- visiting the match (Orosz & Bíró, 2009)

The importance of the role of coaches in the development of sports talent

According to Budavári (2007), the coach can be considered the key figure in the triad of cooperation between the coach, student and parent, according to him, athletes listen to their coaches more than their parents, they expect recognition from them, furthermore, the coaches' behavior and reactions greatly influence the students' commitment. It is necessary to interpret the coach's work not exclusively in terms of sporting goals, but in a broader sense: the complex goal system of education. Childhood is indisputably the period of establishing the necessary competencies for life (Varga et al., 2018): The person of the coach can be a milestone in the child's personality development. It has been proven that the coach's behavior and relationship with the athlete is often more important than the child's basic abilities in terms of talent development. It is important that the coach knows when to encourage and when to take back the pace and expectations. If there is no harmony between the coach and the

player, the player's efforts can easily decrease and the risk of leaving the sport can increase. In such cases, it is worth making an effort to prevent the loss of talent. However, it is important to distinguish between the fact that the coach-student relationship plays a role in the loss of motivation, or that the player's motivation has been lost due to other reasons. This requires adequate self-reflection and self-knowledge on the part of the professional, as well as being well aware of the player's circumstances.

Encouragement and external reinforcements can mean a lot even to players with strong internal motivation. Professional players look up to their coaches from a young age. Talented young people see the coach as the person who leads them to the gate of success. According to Bloom's career phase model, coaches play different roles at different stages of an athlete's career. They approach athletes with different attitudes and expectations, emphasize different aspects of sports activities, and set different expectations for students in the stages of introduction, development and improvement. A completely different empathic skill, communication style, goal setting, training method, development strategy, etc. It may be necessary in the case of athletes in professional status, as in the case of preschoolers who are just starting. However, regardless of the career phases, certain factors may be important in general in terms of promoting talent development. The most important factors may be the coach's expertise, personality, motivation, and commitment. Expertise, on the one hand, from a sports-professional point of view, and on the other hand, from a pedagogical-psychological point of view, may be necessary for effective talent management. Professional sports expertise (knowledge of training theory, professional methodology, sport requirements, etc.) can help, for example, the coach to be able to:

- take into account age characteristics in development
- recognize the optimal physical load level
- set realistic development goals
- to be aware of what factors need to be developed and how
- to be aware of what technical and tactical elements need to be mastered and how

Coaches often instinctively feel the right behavior leading to the right solutions. Thus, coaching effectiveness is not merely the result of what has been learned, but can also arise from the characteristics of the coaches' personalities (Csáki & Takács, 2020).

Gombocz (2008) classifies sports professional requirements among the requirements imposed on coaches, which include knowledge related to age characteristics, the load on the body, the development of conditioning abilities, and the development of technical and tactical knowledge in sports. During the

talent management of young footballers, the selection and application of educational methods suitable for age and ability are of great importance, since the decisions made in educational situations influence the development of athletes (Kiss & Bognár, 2018).

RESEARCH HYPOTHESES

We assume that the most important feature and ability in the development of talent, according to the coaches, are the emotional, volitional, and motivational factors. After all, if a player is emotionally balanced and has sufficient motivation, there is a greater chance that he will perform better on the field.

We expect that the most important educational influence is setting an example according to the coaches. After all, especially in the case of the younger age group, it is the teacher, the coach in football training, who they look up to and look up to as a role model.

We assume that parental sacrifice and support can be an important factor in children's sports performance. After all, in the case of the younger age group, it is the parents who contribute a lot to the child's success in the given sport. They take the child to training. They provide him with the right equipment.

METHOD

We conducted indirect and direct research to prove our hypothesis. With our indirect research, we reviewed and processed the relevant literature. The method of our direct research is questioning, as a tool we used a questionnaire compiled for coaches and parents. We illustrate the questions related to the research topic by processing the results of questionnaires among coaches and parents. In the first part of our topic, we describe our indirect research and the processing of the relevant literature. Talent as a concept, as well as how family influences influence the development of talent, children's sports performance, the importance of the role of coaches in the development of sports talent, for which we used several specialist literature. We specifically highlighted what these activities develop and what the youth coaches should pay attention to when using them. In the second part of our article, presenting our research methods. We are presenting the results of our direct questionnaire research. We analyzed the answers to the questions, illustrate the data in tables and diagrams. Drawn conclusions in the final chapter of our article, evaluated and summarized the answers to our questions.

RESULTS

1. Question:

The most important feature and ability in the development of talent

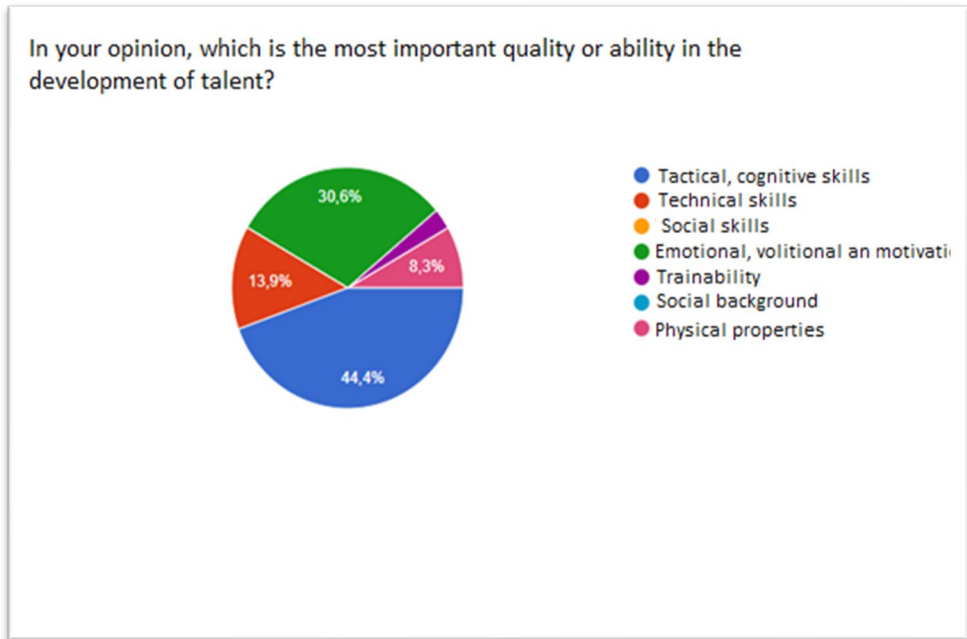


Figure 1. Ratio of skills and factors involved in the development of talent

The youth coaches participating in the study could choose from 7 statements and options:

Among the statements, the responding coaches included tactical and cognitive skills in 44.4%, technical skills in 13.9%, emotional, volitional and motivational factors in 30.6%, and physical abilities in 8.3%. in, and trainability was considered the most important factor in the development of talent in 2.8%. From the proportions, it can be seen that the most common answer was tactical and cognitive skills (44.4%), however, in our opinion, the most important factor is the emotional, volitional and motivational factor, since if there is not enough motivation and will, then the children do not strive for improvement and development, they don't have the certain hunger for success that would improve their own abilities and skills, as well as contribute to the success of the team with their abilities and talents. We would also declare emotional factors

to play a key role, because if there is not enough self-confidence, problems arise at home, which means that the child cannot focus on football and performance to the maximum extent. Coaches play an outstanding role in improving children's emotional world (one-on-one conversations).

2. Question:
The most important educational effects

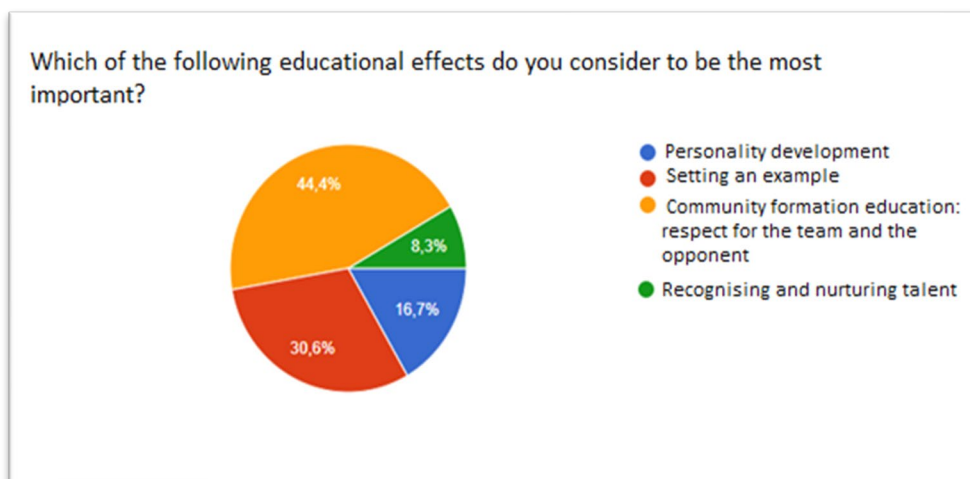


Figure 2. *The ratio of the most important educational influences according to the coaches*

The answering coaches could choose from 4 statements, it can be seen and read from the proportions that the most common answer is community building education: respect for the team and the opponent (44.4%). The second most common answer was setting an example (30.6%), the third was personality development (16.7%), and the fourth was recognizing and nurturing talent (8.3%). In our opinion, it is important that we can be role models for children, that they can look up to us, that we can motivate them sufficiently, and that we not only teach and develop football-related things, training and education, but also that they become good people, respect each other, their parents and their coaches. Of course, it is important that they use their skills and talents and become successful adult footballers, but the most important thing for me is that they become great people.

3. Question:
The most important learning methods for learning the characteristics of football

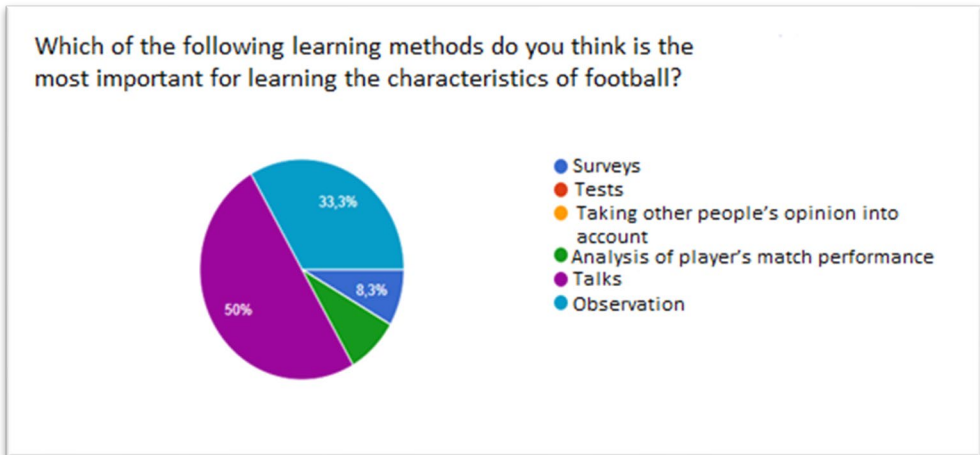


Figure 3. *Proportion of cognitive methods*

Most of the coaches selected conversation (50%), conversation turned out to be the most important method of getting to know the characteristics of soccer players. Personally, we also consider conversation to be the most important method of getting to know a child, because during a conversation with a child, we can learn a lot about the child's spiritual world, his qualities, and his intelligence. Observation as the second most common answer is also important, by observation we mean the child's body language, non-verbal communication, from which we can learn a lot of information about the child and treat them based on this, we can pay attention to children, every child has a different attitude, some are more withdrawn, some are more lively, sociable people.

4. Question:
Discussing the mistakes seen in the match



Figure 4. *After the match, the parents discuss with their children the performance in the match, the mistakes that need to be corrected*

There were 2 possible answers to the question posed to the parents. Among the parents, the most common answer was yes (60%), while no (40%) was less common among the answering parents. Based on our own experience, it is important that the child not only discuss the performance with the coach, but also with those loved ones (father, mother, brother), who can always honestly express their opinion to their children and sufficiently motivate them in what needs to be improved. It is also important to praise the child and to confirm in him that he can always count on his parents, luckily we was able to experience it in our childhood, parents have a big role in the child's development and sports performance.

5. Question:
Children's nutrition



Figure 5. *Parents pay attention to their children's nutrition commensurate with sports, and prepare their diets accordingly*

Based on the answers submitted, 65% of parents answered yes, two-thirds of parents pay attention to their children's nutrition. A significant number of parents of younger children do not pay attention, they largely answered no, while the majority of parents of older, adolescent and youth age groups answered yes. Proper nutrition is important for achieving good sports performance, it reduces the possibility of obesity. It is also important for the muscles to take in the right nutrients, vitamins, and fibers, thereby reducing the number of possible injuries. Proper nutrition is the key to many things, and the role of parents is important, since after a long day at work, a mother or father takes the trouble to prepare food for their child that is suitable for sports.

6. Question:
Providing the necessary equipment for football



Figure 6. *Providing children with the necessary equipment for soccer*

A significant number of parents answered yes (95%) to the given question. It is a fact that it does not depend on who is good or what kind of shoes they have on their feet, but it is more difficult to perform well in a broken, worn-out shoe with cleats, as the foot will also hurt more, and the focus is not on performance, but on pain, which is an obstacle to successful development and performance. It is important that children are able to train in appropriate equipment depending on the weather conditions.

First hypothesis: not confirmed

(We assumed that, according to the coaches, the most important feature and ability in the development of talent are emotional, volitional, and motivational factors.)

Based on the answers received, the most common answer was tactical and cognitive skills.

Second hypothesis: not confirmed

(We expected that the most important educational influence is setting an example according to the coaches.)

The most common answers given by the responding coaches were community education, respect for the team and the opponent.

Third hypothesis: confirmed

(We assume that parental sacrifice and support can be an important factor in children's sports performance.) The responding parents answered the three questions we asked positively, they help and contribute to their children's development and good sports performance.

CONCLUSION

As our topic, we chose football youth training, an important part of which is the task and role of coaches and parents in the development of children's performance and talent. From this, we mainly highlighted the characteristics of the children's talent, the reason for its fulfillment, the professional and pedagogical influence of the coaches, as well as the sufficient support and forms of behavior of the parents, as areas to be investigated. In our chosen topic, we are looking for the answer to whether parental support and sacrifice are an important factor in children's sports performance, in the fulfillment of their talents, and in terms of pedagogy, education, and sports performance, what and which abilities do the coaches consider most important for the child in the development of talent. The results of our research partially confirmed our assumption that parental support is an important factor in your child's development path and sports performance, and most parents take their role in this, as can be seen from the answers. At the same time, there were some of our hypotheses that were not confirmed. It can be read from the answers of the interviewed coaches that they did not consider setting an example to be the most important educational and pedagogical influence for children, but rather community formation - respect for the team, the coach and the opponent - they thought and believed to be the most important. Our third hypothesis was not confirmed, since the most common answer given by the coaches to the question answered by the coaches, which is the most important ability or skill in the development of the child, in the development of his talent, was tactical and cognitive skills on the part of the coaches, which we considered to be the emotional and motivational factors.

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THE IMPORTANCE OF VIDEO ANALYSIS IN HUNGARIAN FOOTBALL

János TÓTH Jr.^{1*}, Gabriel JÁVORCSÍK¹, János TÓTH¹

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ABSTRACT. In results-oriented football, teams use innovative technologies to increase efficiency. One of these technologies is video analytics, and we explore its importance in Hungarian football. Our research hypotheses are based on assumptions, based on which we interviewed video analysts of NB1 teams who were given a questionnaire with different questions to answer and based on their answers we evaluated their opinion on video analytics, what advantages and disadvantages could be derived from the use of video analytics. Also, how many video analysts per team are employed by an NB1 team and to what extent video analysts cooperate with scouts to help them identify talent? In our research, 20 NB1 video analysts have completed the questionnaire so far. Statistical calculations were calculated using a one-sample Wilcoxon test and a binomial test. The video analysts' answers showed that video analysis is actively used to analyze the opponent's game. Furthermore, video analysis is also used to analyze player performance, to develop training plans and to select new players. All in all, it can be clearly concluded that the use of video analysis has more advantages than disadvantages and that video analysis plays a positive role in Hungarian NB1 football.

Keywords: *football, video analysis, questionnaire.*

INTRODUCTION

Professional football is a huge business today, a \$30 billion (Cotta, 2016) business globally every year, so football teams want to get the best possible results. This focus on results means that teams are using newer and newer

¹ *Hungarian University of Sports Science, Budapest, Hungary*

* *Corresponding author: toth.janos@tf.hu*

technologies to increase efficiency, not only in the preparation process, but also in in-match and post-match analysis. The introduction of new technological developments is supported and adopted not only by teams, but also by the International Football Federation (FIFA) (Peña & Touchette, 2012). My work mainly aims to both assess and research the importance of video analytics in Hungarian football. The aim of my research is to examine the importance of the role of video analysis in Hungarian football and to point out the advantages and disadvantages of video analysis. According to Csáki and Takács (2020), the role of video analysis varies from age group to age group as the objectives are different for each target group. The role of video analytics in youth football is different from that in adult football. While in the early school age video is used playfully, in the adolescent age team video takes over the role, and in the youth age video analysis refers to the tactical requirements of adult football and motivational videos appear. According to Peña and Touchette (2012), starting with the UEFA European Championship in 2008, FIFA has made video analysis a more detailed data analysis tool from 2010 onwards, thus opening up the use of modern techniques in football. According to Cotta (2016), football accounts for 43% of the global sports market, a quantified annual business of \$30 billion and growing. Analysis by Hughes and Franks (2008) shows that the development of video analytics technology has changed the way movements are evaluated and analyzed, which has also influenced training methods. The availability of technological tools now allows coaches to collect information relevant to themselves and their athletes and to examine it continuously to help their athletes develop.

The article by Hughes, Bartlett and Carter (2011) pays particular attention to the advantages and disadvantages of using video analysis and shows how this technique can be usefully applied in football. The authors review the history and current practice of the use of video analysis in professional football and examine how it affects decision-making and performance. Finally, the authors make recommendations for further development and application of video analytics in professional football.

Tenga and Böhm (2010) investigate the use of video analytics in football training. The authors review previous research and publications on the use of video analysis in football and present its benefits and impact on training processes and player performance. They also examine how video analysis can be used most effectively in training to maximize player development. In Franklin and Williams (2010) the influence of video feedback on team tactical behavior in soccer, the authors examine the impact of video analysis on team tactical behavior in soccer. The paper shows how video analysis can be used to improve team tactics and how video analysis-based feedback affects team play. Results show that video analysis improves team tactical awareness and improves team performance on the field.

Lindström, B. (2008) Traces Swedish top-flight football and shows how video analysis has been used in this sport. The paper examines the experience of using video analytics in Swedish top-flight football and looks at how it has helped to improve and achieve success. Carling, Williams and Summerbell (2008) study the impact of video analysis in football on the tactical behavior of under-14 footballers. The authors conducted research with the aim of understanding the impact of video analysis on the tactical behavior of young players and how this behavior can be improved. Based on the results of the research, the authors found that video analysis greatly improved young players' tactical behavior, including situational awareness, decision-making and coordination. Bailey, R., & Drakes, J. (2007) this paper examines the effects of video analysis on the performance and tactical behavior of under-19 football players. They investigate how video analysis affects player performance and how it affects players' tactical attitude. The researchers' results show that video analysis improved players' performance and tactical behavior and increased players' sensitivity to tactical conduct. Hassink and De Meester (2008) the authors present a review of the current literature on the use of video analysis in sports coaching. The review shows how video analysis can best be used in sports training and also describes the potential advantages and disadvantages of using video analysis.

HYPOTHESES

In the course of our work, we formulated three hypotheses:

1. We hypothesized that more than 3 video analysts work for an NB1 team.
2. Furthermore, we assumed that more than 50% of the video analysts work together with the scouts.
3. We assume that video analysis has more advantages than disadvantages.

METHOD

During our work we visited Hungarian NB-1 teams who actively use video analytics in their work. We consulted the experts responsible for this field and used their information to prepare a questionnaire. In the questionnaire we asked 5 questions. A total of 20 NB1 video analysts completed the questionnaire. The analysts were contacted partly in person and partly online. In our questionnaire we asked the following research questions: Does video analysis have more advantages than disadvantages? On average, how many matches are watched

to analyse the opponent's game? What do you think are the advantages of video analysis? What do you think are the disadvantages of video analysis? What competencies and personality traits are required for a video analyst? The statistical calculations are calculated using a one-sample Wilcoxon test and a binomial test.

RESULTS

The following questions were included in the questionnaire, and the results were the following answers to the questions asked:

On average, how many matches do you watch to analyze the opponent's game?

Based on the responses received, as shown in our pie chart, on average analysts watch 3-5 matches to examine the opponent's game. In my questionnaire, the video analysts stressed that the number of matches they watch and analyze depends on the age group.

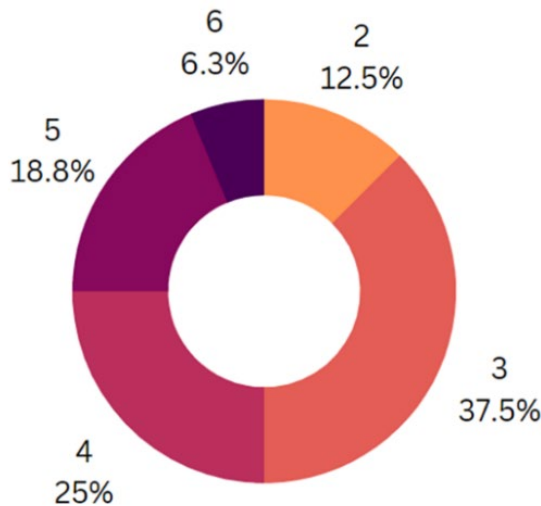


Figure 1. On average, how many matches do analysts watch to analyze the opponent's game?

What do you think are the benefits of video analytics?

In our research, analysts listed many more advantages than disadvantages. The most common answers are:

Detecting and correcting errors for staff.

To assist the Director of Sport in decision-making.

Objective feedback to both staff and players in the development of individual and team tactical elements.

From a distance, with a cold head, performance can be assessed through recordings.

Especially for younger age groups, it is now almost indispensable to use visualization to show areas for improvement and to point out mistakes.

Saving time: video analytics can help save time, as players' performance can be analyzed faster and more efficiently than before using manual methods.

Replay: video analysis allows football professionals to replay games, which can help them to better understand the evolution of games and the performance of players.

Advanced statistics: video analytics can help you generate advanced statistics to better assess player performance.

Video analysis can help football coaches to develop appropriate training plans based on the analysis of players' performance.

Video analysis helps football teams to recruit new players - players' performance can be assessed more accurately.

What do you think are the disadvantages of video analysis?

True, analysts cited far fewer disadvantages than advantages, but there are also disadvantages.

The most common answers are:

Still a less accepted and recognized profession in the football community.

It requires extreme concentration and tolerance of monotony.

Technology is costly: Advanced video analytics systems and tools require significant investment, which can be a problem for smaller clubs.

Does not take psychological factors into account. Video analysis cannot take into account the psychological state, motivation and self-confidence of players, which are important factors in football.

Video analysis is only a tool in football and does not guarantee success. Results may depend on the skills of the players, tactics and other factors.

What competences and personality traits are required for a video analyst?

The competencies and expected personality traits mentioned by the analysts are, in my opinion, essential for a video analyst.

Most common answers: basic IT skills, knowledge of digital tools, sports skills, tolerance of monotony, punctuality, ability to work cooperatively, ability to concentrate, communication skills.

How many video analysts work at the club?

Hypothesis 1: Confirmed (I assume there are more than 3 video analysts working for an NB1 team).

Based on the responses received, an NB1 team will employ a minimum of 3 and a maximum of 7 video analysts. Our statistical calculations were calculated using the one-sample Wilcoxon test in the JASP program with a value of $p < 0.001$.

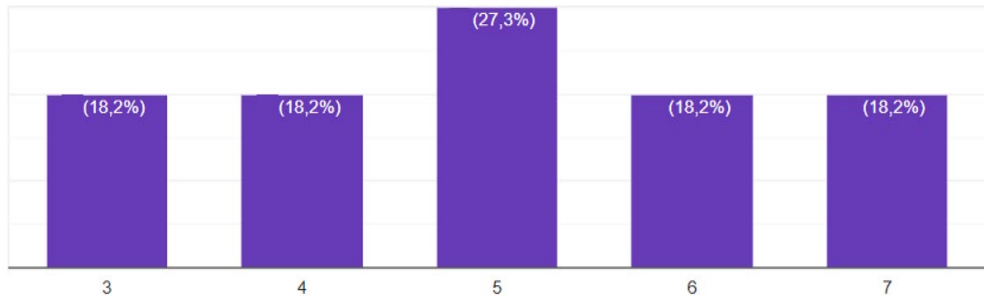


Figure 2. How many video analysts are hired by an NB1 team?

In what process, for example: talent scouting, does the team's video analyst work with Scout?

Second hypothesis: proven (It was assumed that more than 50% of video analysts work with scouts).

Based on the responses received, 75% of analysts cooperate with scouts and 25% do not cooperate. Video analysts assist in scouting talent, collecting data, and accompanying scouts to games (Hughes & Franks, 2008). We calculated our statistics using a binomial test $p = 0.021$ in the JASP program.

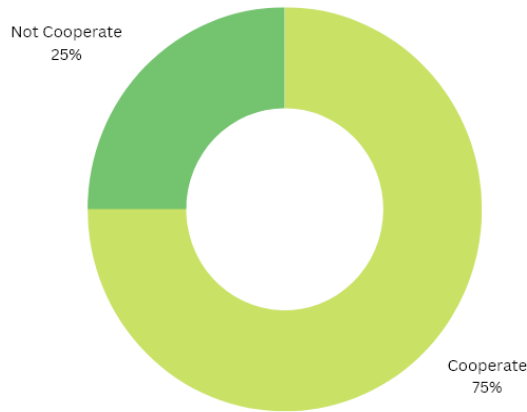


Figure 3. What percentage of videographers work with scouts

CONCLUSIONS

The hypotheses of the survey were confirmed, that there were more than 3 video analysts working for an NB1 team, the responses received indicated that there were up to 7 video analysts per club, but more than 3 for each club. Also confirmed was the fact that more than 50% of the scouts work with video analysts, based on the questionnaires received, which in our case is 75%. The third hypothesis was also confirmed, that video analysis has more positive than negative effects. The questions answered in the questionnaire describe the importance of video analytics and show the extent to which clubs use the information provided by analysts. It is on the basis of this data that decisions are made by top management, coaches, scouts and other members of staff.

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THE INDIVIDUAL ACADEMIC WORK IN THE VOCATIONAL TRAINING OF PHYSICAL EDUCATION AND SPORT SPECIALISTS

Gheorghe VOLCU^{1*}, Irina VOLCU^{1*}

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ABSTRACT. In this article we approach the topic of individual academic work in the vocational training of specialists of physical education and sport. This activity, very important in the university educational process, is promoted both within classroom hours and outside of them, but most often individual work is promoted within seminars, laboratory hours, projects, practical works, competitions and performing tasks at home. Individual work is one of the main forms of study of subjects by students specializing in physical education and sport, expressed by studying theoretical topics, performing control and laboratory work and applying knowledge to carry out semestrial, periodical and final assessments. Starting from the analysis of references on the mentioned topic and ending with qualitative and quantitative reflections from the specific university context, we highlight the aspect of the individual work of the students from the point of view of professional training. It is carried out for the purpose of students specializing in physical education and sport acquiring general and special professional skills, including the ability to use the knowledge acquired in the professional field. An important result of the individual work of students is the formation of their ability to train individually in order to obtain knowledge, skills, competences for the purpose of continuous professional development.

Key words: *Physical education and sport, vocational training, individual work, high education, student, teacher, curriculum.*

¹ State University of Physical Education and Sport, Chisinau, the Republic of Moldova.

* Corresponding authors: volcugheorghe@mail.ru, volcuirina86@gmail.com

REZUMAT. *Lucrul individual academic în formarea profesională a specialiștilor de educație fizică și sport.* În acest articol abordăm tema lucrului individual academic în formarea profesională a specialiștilor de educație fizică și sport. Această activitate, foarte importantă în procesul educațional universitar, este promovată atât în cadrul orelor auditoriale, cât și înafara acestora, dar cel mai frecvent lucrul individual se promovează în cadrul seminarelor, a orelor de laborator, a proiectelor, a lucrărilor practice, în cadrul concursurilor și la efectuarea sarcinilor pentru acasă. Lucrul individual este una dintre formele principale de studiu al disciplinelor de către studenții specializați în educație fizică și sport, exprimat prin studierea temelor teoretice, efectuarea lucrărilor de control și de laborator și aplicarea cunoștințelor la susținerea evaluărilor semestriale, periodice și finale. Pornind de la analiza surselor de referință la tema menționată și finalizând cu reflecții calitative și cantitative din contextul universitar specific, evidențiem aspectul lucrului individual al studenților din punct de vedere al pregătirii profesionale. Acesta se desfășoară în scopul dobândirii de către studenții specializați în educație fizică și sport a unor competențe profesionale generale și speciale, inclusiv capacitatea de a utiliza cunoștințele dobândite în domeniul profesional. Un rezultat important al lucrului individual studentesc este formarea la aceștia a capacității de a se instrui individual pentru obținerea de cunoștințe, abilități, competențe în scopul dezvoltării profesionale continue.

Cuvinte cheie: *Educație fizică și sport, formare profesională, lucru individual, învățământ superior, student, profesor, curriculum.*

INTRODUCTION

The qualitative training of specialists in the field of physical education and sport leads to the need to strengthen the efficiency of the teaching-learning-evaluation process of students based on individualization and differentiation, allowing them to fully highlight their intellectual potential.

Currently, the process of differentiation and individualization of higher education must be the permanent, primary concern of both teachers and students.

Higher education, according to the Education Code of the Republic of Moldova (2014), is organized and conducted based on content standards, competence standards, national reference standards and accreditation standards.

In the conditions of the increase in social, community and individual requirements towards higher education, it seems logical to implement a type of educational management that leads to the increase of the offer of services, their efficiency, to the promotion of performance in conditions of competitiveness (Volcu, 2017).

Thus, any higher education institution is responsible, autonomously, for the development of a culture of quality, i.e. policies, techniques and practices consistently applied and thoroughly documented to obtain those results/performances that are consistent with the expected objectives.

Student-centered education focuses on putting the emphasis on students' thinking, on their involvement in the realization of projects, on solving problems tangential to practical life (by finding new and original solutions), on scientific investigation and learning new research techniques, stimulating thinking, imagination, creativity and originality of the learner and thus removing the lack of motivation and interest. These take shape during lectures, seminars, practical and laboratory hours, but more importantly, within the individual activity of the student. Therefore, in the current system of vocational training and "lifelong learning" competence, the essential role is played by individual work, the dominant activity, which constitutes one half of the teaching-learning process.

Individual work is an educational and scientific research activity, which aims to develop the necessary skills and is carried out with the teacher's methodical guidance, but without his direct participation. It is an important form of training, aimed at training a specialist who will operate efficiently with professional skills, being capable of continuous development throughout life.

Approaching in an empirical way the development of autonomous learning competence in students, the researcher M. Ștefan (2014) experiments with several strategic options for facilitating autonomous learning, including: experiential learning, simulated learning, self-directed learning, reflective learning and learning with the help of new information and communication technologies, thus opening perspectives of differentiation and individualization, but also of relevant contextualization of the university training process.

In order to carry out the individual work more efficiently and effectively, the student needs a wide range of basic skills, which are essential in a wide variety of situations. But the most important thing for students from all cycles is the ability to develop appropriate independent learning strategies (Goraș-Postică, 2019).

The main purpose of the individual work of students specializing in physical education and sport is to improve their professional training and specialized knowledge, aimed at the formation of an effective system of fundamental and professional theoretical-practical knowledge, skills and abilities that they could apply in practice. Thus, we are talking about the training of tomorrow's specialists, who will be globally competitive, who will be able to solve creatively with the help of knowledge, tasks in their field with the most significant effect both for themselves and for society as a whole.

According to the Framework Plan for Higher Bachelor Studies (cycle I), of master (cycle II) and integrated higher studies (2020), the ratio “direct contact hours - individual study hours” is established depending on the field of specialized professional training/ master’s program, the study objectives, the specifics of the course unit/module, the degree of novelty and/or complexity and the methodological-didactic assurance. This report is established by the relevant chair/department, based on a specific methodology for each general field of study, approved by the Senate, upon the proposal of the Faculty Council that organizes the respective study program.

For the efficient organization of individual work, the teacher must take into account some conditions that will ensure the successful completion of this activity. We mention first of all the motivation of the students regarding this training activity, that is to explain to the students: for what?, why?, what does it help? Then follows the exposure of some cognitive tasks, as well as the clear definition by the teacher of the types of tasks, the workload, the time interval for their completion. No less important are the assessment, reporting criteria, etc., as well as the types and forms of control.

OBJECTIVE AND HYPOTHESIS

Through this paper, we aim to effectively contribute to the vocational training of the physical education and sport specialist by promoting individual activities to students/master students, so that to be competitive on the labor market.

In this research, we started from the hypothesis that the active involvement of students/master students in activities of an individual character will significantly improve their professional development.

The purpose of the research is to emphasize individual academic work in the vocational training of specialists in the field of physical education and sport.

MATERIALS AND METHODS

We used the following methods of research: theoretical analysis, statistical-mathematical method, graphical method, investigation method, interview, observation.

Data collection was carried out by developing a questionnaire and filling it in by the students. Participants were asked to provide an answer for each item. For this, the respondents were given general instructions on how to complete the questionnaire, as well as the use of the data provided by them.

At the same time, an analysis was carried out of some documents that regulate the university study process, such as: Framework plan for higher studies; Education plan, Curriculum; SUPES Quality Manual etc.

RESULTS AND DISCUSSIONS

For each course unit/module, the Curriculum (curricular program) is developed by the department and approved by the Faculty Council. It includes the description of the course unit/module and the actual content. The content of the course/module in the curriculum includes suggestions for individual activity, including the description of the interactive forms for individual study guided by the teacher, used by the teaching staff, the topics, the tasks and the number of hours.

Sv. Focşa-Semionov (2010), in a valuable study, claims that “at the university level, achieving academic performance within the curriculum requires a certain logic of the student’s movement towards mastering the subjects, as well as the self-regulation of this movement, that is, of their own learning process. At each learning stage, corresponding to the basic form of the activity carried out, the subject forms and develops specific regulation mechanisms, skills and self-regulation abilities. It remains essential that the process of self-regulation of the learning activity, complex by its nature, functions as an integral unit, only that at one stage or another of the learning the focus shifts to one of its components”. Thus, self-regulation of learning is recognized as a central competence in the context of academic learning, equally, as a determining condition of learning efficiency, as well as an essential objective of university education of all times; however, in the Information Age it takes on complex connotations.

Thus, one of the most requested activities for the materialization of individual student work is the elaboration of reports, for which we recommend suggestions (Table 1), regarding their implementation.

The report consists in the elaboration of a work based on individual investigation, in which the essence of a problem or an idea is synthesized from works close to the theme, including personal opinions on the subject addressed. The content of the report must be logically structured, presenting arguments in support of the ideas addressed.

Table 1. Suggestions for individual work

The structure of the product	Achievement strategies	Deadline for the submission
REPORT		
<p>1. <i>Title page</i></p> <p>2. <i>Content</i></p> <p>3. <i>Introduction</i> (displayed on 0,5-1page), which will refer to:</p> <p>3.1. <i>The relevance and importance of the topic</i> (briefly exposed in an alignment);</p> <p>3.2. <i>The purpose</i> (reflects the finality of the investigation carried out, the meaning of the study, the goal pursued) and the concrete objectives of the study (denoting the expected results following analyses, calculations, solving theoretical and methodological problems);</p> <p>3.3. <i>The object of the study renders the field, sphere, sector, branch, economic entity, subdivision, etc. to which it refers;</i></p> <p>3.4. <i>Applied research methodology</i>, which includes:</p> <p>a) the information base (legislative and normative framework, methodological sources, monographs, scientific works, statistical databases, etc.)</p> <p>b) the research methods used (quantitative and qualitative);</p> <p>3.5. <i>Key words.</i></p> <p>4. <i>Presentation of the content</i> in 2 subjects (3-5 pages for each subject).</p> <p><i>Subject 1.</i> It will contain the theoretical approach to the studied problem with a review of the most relevant opinions of noted specialists in the field according to the bibliographic material;</p> <p><i>Subject 2.</i> It has an analytical character and can contain quantitative and qualitative analyzes of the real situation of the researched object, critical assessment of the current state, highlighting existing problems, etc.</p> <p>5. <i>Conclusions and recommendations</i> (~1page). In this compartment, conclusions are formulated and some recommendations are put forward regarding the highlighted problems.</p> <p>6. <i>References to bibliographic sources</i>, cited in the main text of the report, completed in the appropriate manner, not less than 5 sources.</p>	<p>1. Choice of subject</p> <p>2. Bibliographic study</p> <p>3. Delimitation of the study area:</p> <p>3.1. The temporal dimension (the period under analysis);</p> <p>3.2. The spatial dimension (the information system, the information security system, information technologies in ensuring national security, etc.);</p> <p>4. Formulation of objectives</p> <p>5. Selection of the necessary methodology for the study (reading, observation, analysis of normative acts, document analysis, statistical analysis, etc.);</p> <p>6. Analysis and processing of information;</p> <p>7. Rendering the content according to the drafting rules in force and perfecting the report itself;</p> <p>8. Presentation of the product and its support within the established terms.</p>	<p>At least 2 weeks before the end of the semester.</p>

The individual academic work of students has the following *advantages*:

- Facilitates the development of an independent work of the student, helps him to organize, monitor his own learning and activity;
- Stimulates confidence in one's own powers and abilities;
- Forms skills to use and work with different tools and equipment;
- Stimulates the work of research and scientific investigation;
- Stimulates the activity of the teacher and his ability to apply strategies and techniques based on the individual work of students in teaching/evaluation.

I. Neacsu (2006), argues the usefulness and functionality of the concept of independent learning, based on the changes that have occurred in recent years in the academic environment, proposes various strategies, methods and techniques of independent academic learning and opting for "a university policy of the culture of independent academic learning, became not only a component, but also a standard of the quality of processes, products, satisfaction, efficiency and effectiveness, but also the competitiveness of the university".

The individual study of the student guided by the teacher is carried out depending on the specifics and particularities of the course unit and is provided for all course units in the curriculum of the study program. The ratio of direct contact hours and individual work is 1:1 in full-time education (the exception is practical subjects, where the ratio is changed in favor of direct contact hours (2/3 to 1/3) and 1:3 - for part-time education.

O. Dandara (2009), investigated independent academic learning as a way of training professional skills, explaining the reason for reducing the hours of direct contact with students by focusing professional training on training skills; or, competence whose components are ability and attitude is formed only through own effort. Hence the insistent promotion of ideas: the active involvement of the student in his own training and the teacher-student educational partnership. In the given study, the author concludes that "if the teacher wants the student to work more individually, then he must work more with the student", in the classroom and through systematic individual consultations, we believe.

T. Repida (2015) makes a brief, but approved and important retrospective of the connections and continuity in the organization of individual student activity through a historical approach, based on the analytical programs in the universities of the Republic of Moldova, advocating for the improvement of process and time monitoring necessary, but also of the cooperation between university professors, who teach at the same faculty/year of studies.

The individual activity guided by the teacher includes the additional study of course materials, additional consultations for students with a low rating, who encounter difficulties in completing study tasks, the organization of didactic activities with the use of various interactive forms, including discussions; carrying out current assessments; checking essays, papers, reports, projects, portfolios, case studies, etc.

The individual study guided by the teacher is included in the Chart for guiding individual work at each department and is part of the weekly workload of the teaching staff and the student. Within the departments, various forms of organization of individual work are applied, presented in the curriculum by study subjects, their share is reflected in Figure 1.

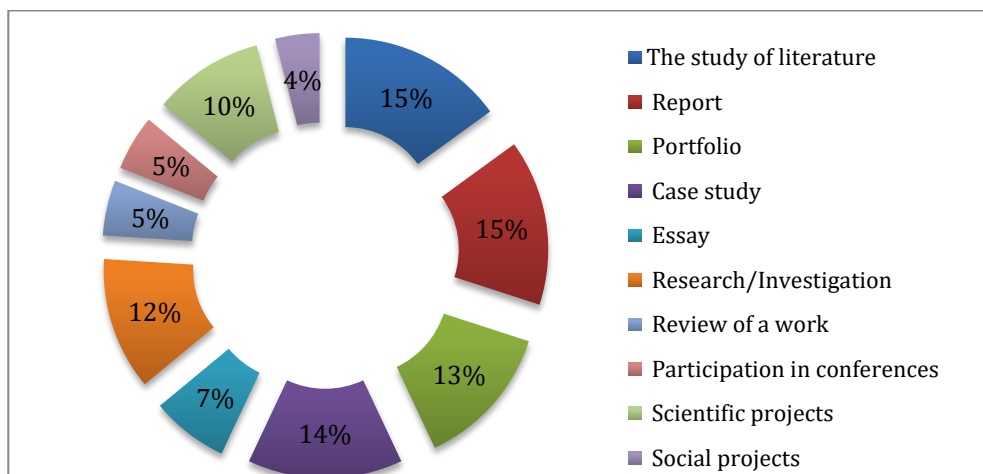


Figure 1. The share of individual work organization forms

One of the indicators of the effectiveness of the Quality Management System in the university is the evaluation process, taking as a measurement parameter the satisfaction of the students.

Students are not only clients/beneficiaries of the institution, but also products of the university, as participants in the vocational training process, by assimilating the knowledge and skills that form their professional competences, certified by university diplomas. In this context, students participate in all the activities of continuous improvement of the quality of the processes, aiming to satisfy the requirements of the university's customers (Manolachi, Demcenco, Ghețiu, Zavalîșca and Mocrousov 2018).

Thus, the assessment of individual work by students (Figure 2) is evaluated with the qualification “very well” - 44%, “excellent” - 27% and “well” - 29%.

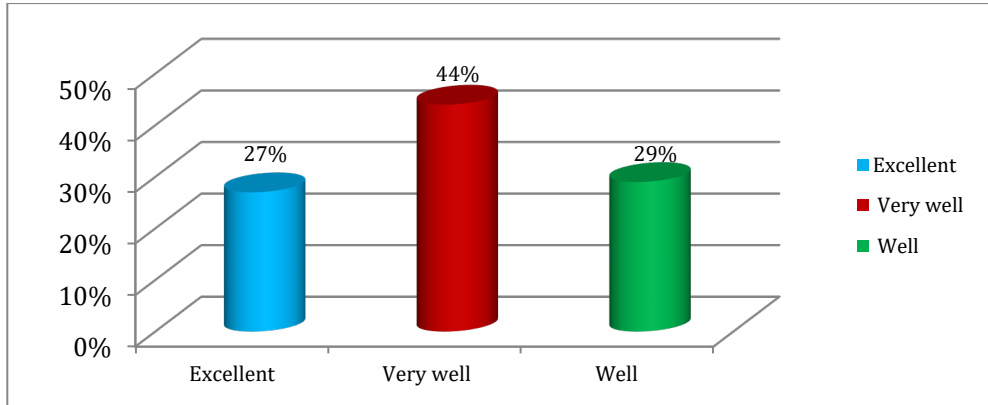


Figure 2. Appreciation of individual work by students

Analyzing the obtained results, we can mention that the individual academic work of the students is carried out in various forms of organization and is appreciated by the respondents (71%). This suggests that students engage in individual activities and as a result their professional development is enhanced.

CONCLUSIONS

Individual academic work has a great influence on the professional development of physical education and sport specialists, being an important form of training aimed at training a specialist capable of operating effectively with professional skills.

The diversity of the forms of organization of individual academic work makes this activity more attractive and efficient, and the result of its appreciation (71%) by the respondents indicates that they are actively involved and ultimately contribute to their professional development.

Despite the fact that the paradigm of initial training is gradually changing at an accelerated pace and innovations on multiple dimensions are timely, the aspect of individual study will be current and beneficial, especially in distance education through information and communication technologies.

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