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SUBLIMINAL STIMULATION IN THE CASE OF YOUNG PEOPLE PRACTICING SYSTEMATIC PHYSICAL ACTIVITIES

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Abstract. *In recent decades, especially as a result of intensive research in the field of cognitive psychology, the importance of unconscious (implicit) information processing, with implications for various adaptive processes, has been increasingly highlighted. The psyche is characterised by permanent information-energy communication between the conscious, unconscious and subconscious levels. Communication with the unconscious can represent, in the case of athletes, an important (but still insufficiently explored) resource in striving to develop performance capacity. This study focused on developing a procedure for the application of subliminal stimuli in order to identify their influence on the responses of participants. The study included 54 athletes (aged 20 to 22 years), students at UNEFS Bucharest. In our experiment, we used the following devices and software: computer, video projector and Ulead Video Editor. We can state that the test has been appropriate and subliminal messages have influenced behaviour for 21% of participants in the experimental group (G1), compared to 4% in the G2 group (the subliminally displayed messages were represented by a picture unrelated to the experimental task).*

Keywords: *subliminal message, implicit perception, unconscious processing, physical activity, behaviour.*

Introduction and background

It is specific for the human psychological system to integrate information at the conscious, unconscious and subconscious levels.

The **conscious** is characterised by the occurrence of reflection and communication simultaneously with both the external environment (resulting in the subjective model of objective reality) and oneself (resulting in the subjective model of one's own Ego), generating the spiritual freedom of a person. The conscious engages all processes of the psyche and ensures the hierarchical organisation within the human psychological system.

We use to say that especially cognitive mental processes are conscious, but much of our mental life occurs at the unconscious and subconscious levels, where information is processed in the absence of awareness: implicit perceptions, implicit memory and implicit learning.

The issue of **unconscious** has been addressed since 1567 by Paracelsus in the work *Von den Krankheiten so die Vernunft Berauben* (cited by Aniței, 2010), then by philosophers such as Leibnitz, Hegel and Schopenhauer, but the concept was scientifically substantiated by Freud. In the initial (psychoanalytical) sense, the unconscious includes those phenomena inaccessible to consciousness, in other words, the basic or deep psyche emerging from the abyssal, hidden, profound and pulsating side of mental life. This is, in the Freudian sense, timeless and spaceless, dynamic, tensional and governed by the affective logic, being involved in energising and supporting conscious actions.

Researchers in the field of cognitive psychology (Bornstein, Pittman, Kihlstrom, Barnhardt, Tataryn, Roediger, Schacter, Graf, Masson etc.) highlight an approach to the conscious-unconscious-subconscious distinction from the standpoint of information processing, imposing the terms “implicit” (without awareness) and “explicit” (with awareness). In the modern sense of cognitive psychology, as regards information processing, “we cannot have a propositional attitude toward the unconscious, we cannot have a verbal description of it even in general terms, such as, for instance, the presence or absence of that phenomenon” (David, 2000). We cannot say anything about the contents of the unconscious, we cannot make any kind of statement and we cannot describe them.

The **subconscious** can be considered as “a servo-mechanism of consciousness, an implication of it, a reserve of information and operations generating the facts of consciousness” (Zlate, 2000, p. 67). It preserves memories, “psychophysiological and mental phenomena and traits that do not persist permanently in the sphere of consciousness, but can selectively and easily step over its threshold according to circumstances” (Popescu-Neveanu, 1978). It “stores” all information entered into the system, the skills, the stereotyped intellectual or perceptive assemblies, everything that has ever passed through the consciousness filter and which is currently in a latent state of psychological virtuality, under the episodic control of consciousness. Popescu-Neveanu (1978) shows that the main features of the subconscious are its closeness to the conscious and compatibility with it. Between the conscious and the unconscious, synergy, complementarity or contradiction relationships can be established.

Scientific literature emphasises that one can communicate with the unconscious. The interactive cybernetic communication model posits the quality of information continuum, a characteristic of the psyche being permanent

communication through the permanent transfer of information between the three instances, namely the conscious, unconscious and subconscious.

“But for at least the last century, psychologists and philosophers have been concerned with the possibility of non-conscious perception or perception without awareness – that is, with the possibility that events in the environment might influence our experience, thought and action even though they themselves have not been consciously perceived” (Kihlstrom, Barnhardt, & Tataryn, 1992).

The problem of subliminal messages has been debated since the mid-20th century. In 1957, Vance Packard raises the issue of subliminal influence in his book *The Hidden Persuaders* (Ruști, 2005). A study that drew attention was the one achieved by James Vicary, who repeatedly flashed the slogans “Drink Coke!” and “Eat Popcorn!” throughout a movie (watched at the cinema). Running at a very high speed, the messages did not leave time for the audience to become aware of them. As a result of this subliminal “bombardment”, it was claimed that the sales of Coke had risen 57%, and Popcorn 18% – more than ever before in the cinema area. Subliminal messages and their power to act subliminally were regarded as a bizarre phenomenon. More and more books addressing the possibility to manipulate people through repeated exposure to subliminal messages have begun to be written. There was a strong campaign against recordings of rock music, fearing that they would contain satanic subliminal messages. For example, Lamothe (in Canada) published a book providing a detailed list of the alleged messages included in the song “Stairway to heaven” (Vokey & Read, 1985, p. 1232). The issue of subliminal messages was treated seriously, and the US Senate decided (in the 1960s) that a team of psychologists would investigate the phenomenon.

In 1978, Weiner repeated the Vicary’s experiment. The researcher presented subliminally, throughout a movie, the word “boeuf” (beef), hoping that the viewers would buy beef sandwiches during the intermission, but that did not happen. Actually, by the 1980s, Vicary admitted that the results of his experiment were not true. In the same period, Erdelyi, using some acquisitions of cognitive psychology, mentioned the importance of addressing unconscious information processing, in other words, the cognitive unconscious (Miclea, 1999, p. 124). The unconscious processing of physical characteristics of the stimuli is a certainty. Thus, extracting contours, segregating the background image, detecting motion, surfaces and texture are some of the unconscious processing operations. When addressing subliminal messages, it is necessary to distinguish between the objective sensory threshold and the subjective sensory threshold. If the objective sensory threshold is the minimum value that a stimulus must have to be perceived by the body, the subjective sensory threshold is the limit from which a person becomes aware of the presence of a stimulus. In the case of the subjective sensory threshold, the individual cannot provide any information about the nature or significance of the message that has immersed the unconscious, but is aware of the presence of a certain stimulus. In fact, some studies have demonstrated that subliminal stimulation induces bioelectric changes.

In 1981, Fowler et al. provide evidence that we are processing information in the absence of awareness. In this regard, the authors made an experiment in which they initially presented the subliminal message “lodge” (shelter). In the next stage, two other words were displayed for the subjects: “hotel” and “book”. Their task was to specify which of the two words was closer, as meaning, to the subliminally presented word (“lodge”). Most participants (95-97%) responded correctly (they chose the word “hotel”). Thus, it is noted that the subliminal message is semantically processed (at the unconscious level) in a partial way (the stimulus itself is not processed) (Santrock, 1991, p. 92).

The experiments made by Zuckerman (1960) are also interesting. The researcher displayed 30 pictures, starting from which two groups of subjects (experiment and control) had to produce descriptive stories. Originally, the two groups were treated similarly, according to the same procedure: first, the presentation of the picture, then its description. It was found that the length of the stories produced by the subjects in the two groups was not significantly different. The following ten pictures were accompanied, for the experimental group, by the subliminal message “Write more!” Also for the experimental group, the presentation of ten more pictures was accompanied by the subliminal message “Write less!” Finally, it has been found that the variation in behaviour of the experimental group subjects depends on the content of the subliminal message. It is thus demonstrated that subliminal perception is not a phenomenon without effects on the behavioural plane. The subliminal message is able to “induce” certain behaviours, even if participants are not aware of that (Horghidan, Mitrache, & Tüdös, 2001, p. 64).

It appears that information perceived at the unconscious level can be retained for more than 24 hours. There is an experiment stating that stimuli with a high degree of personal relevance have an impact over a considerable period of time. Its author, Levinson (1965), simulated a crisis situation during surgery, claiming that the patient no

longer had oxygen, did not breathe, his/her heart stopped beating etc. One month later, four of the patient subjects remembered the incident very well, and four others remembered a little about it (Merikle & Daneman, 1996).

In order to support the existence of unconscious processing, electric waves in the brain were recorded during the rapid presentation of some words, under the absolute threshold. It was noted that, although the presented words could not be named, an activation of electric waves occurred in the cortical projection zone of the visual or auditory analyser aroused in the experiment. Thus, Ghevrin (1975) has demonstrated that visual or auditory information is processed by the brain even when it acts at a subliminal level (Zlate, 1999, p. 159).

In psychotherapy, subliminal messages can be used, for example, in the treatment of nerve bulimia, which has an increased incidence in females. From the perspective of psychoanalysts, this disorder is generated by the existence of frustrating relationships between daughter and mother during childhood (Miclea, 1999, p. 128). The subliminal message “Mommy and I are one” was used to restore the original mother-daughter syncretism that had existed before the emergence of reactions, mentioning a significantly improved situation (Silverman & Weinberger, 1985). It has been proven that the subliminal message “Mommy and I are one” has the highest impact on reducing symptomatology, anxiety, depression, schizophrenia, stress, obesity, as well as on increasing school performance (David, 2000, p. 131), because it solves the supposed conflicts of the individual with significant persons in childhood.

A review of relevant literature in the fields of sports psychology, social psychology and personality highlights that performance in various contexts can also be influenced by the state of competitiveness manipulated through subliminal stimulation (Sambolec, Kerr, & Messé, 2007, p. 160). It is emphasised that subliminal messages have influenced the exercise capacity in tasks involving voluntary character traits (perseverance). Other authors also talk about the power of subliminal perception to influence attitudes, judgements and behaviours (Smith & McCulloch, 2012, p. 551). In a study on perceiving the possibility to achieve performance in tasks where the results depend on chance, Custers et al. (2009) have found that the subliminal activation of achievement-related concepts leads to higher expectations for participants before actually starting the activity. Psychoanalysts used subliminal messages with a beneficial effect on solving internal conflicts and increasing performance in competitive situations (for example, archery) (David, 2000, pp. 131-132).

This study focused on identifying a subliminal perception procedure able to generate information processing in the absence of awareness.

We have hypothesised that:

H1: It is possible to communicate with the unconscious level through a procedure involving exposure to subliminal messages.

H2: Through exposure to subliminal messages, processing occurs in the absence of awareness, i.e. implicit perception and memory, which can be highlighted by behaviour.

Material and methods

Participants

The study included 54 athletes aged 20 to 22 years, 36 boys and 18 girls (21 practicing football, 12 artistic, aerobic and rhythmic gymnastics, 3 volleyball, 3 dancing, 7 swimming and 8 martial arts), students at UNEFS Bucharest. They were divided into two groups: G1 (18 boys and 10 girls) and G2 (18 boys and 8 girls).

Equipment

In our experiment, we used the following devices and software:

- computer – only served as a support in the experiment (participants did not provide any response using the keyboard or mouse);
- video projector – participants could view the video containing the subliminal messages;
- Ulead Video Editor – used to replace the first frame of every second of the video with a picture representing the subliminal message.

Procedure

There are several ways through which a stimulus can become subliminal. In our case, we used short-term exposure (Opre, 2002, p. 84), with a recognition-related task.

Our subjects could become aware of the presence of the stimulus, exposure being 1/30 of a second, but the subjective sensory threshold has been taken into account – the subject is aware of the presence of the stimulus, but cannot say anything about its nature and significance.

The stimuli became subliminal as a result of insufficient temporal stimulation of receptor cells on the retina. In a 4-minute video (Bob Marley, “Redemption song” for G1, and Aerosmith, “Crazy” for G2), the first frame of every second was replaced with a picture representing the subliminal message. Thus, every second of the video, an inserted picture immersed the unconscious.

The two groups of the experiment received the same instruction: “Your goal is to relax by watching and listening to the video!”

For G1, the subliminal stimuli were represented by a tennis player performing forehand and backhand strokes.

For G2, the subliminally displayed messages were represented by the picture of a person sitting in front of a computer.

The playing time of the video was 4 minutes.

Subsequently, each participant received a list of 18 different sports (handball, tennis, weightlifting, basketball, athletics, shooting, canoe and kayak, rowing, skating, hockey, surfing, fencing, skiing, wrestling, judo, table tennis, cycling, rugby) and was asked to circle on the list the word having a connection with the message that had immersed the being’s deep areas. For each group, the percentage of those who circled the word “tennis” was calculated.

The video was presented only once (between 10:00 a.m. and 16:00, depending on the participants’ timetable), noticing a total of 240 subliminal messages that had immersed the subconscious (one picture per second). The experiment was conducted between October 2017 and January 2018.

Throughout this process, the ethical principles were assured: there were no constraints, the data were treated confidentially, the participants had the opportunity to withdraw at any time and remained anonymous.

Experimental design

The dependent variable was represented by the participants’ choice from the list of 18 sports, while the subliminal procedure had the role of independent variable.

Results

Figures 1 and 2 highlight the results obtained by the two groups, G1 and G2, after the subliminal induction procedure.

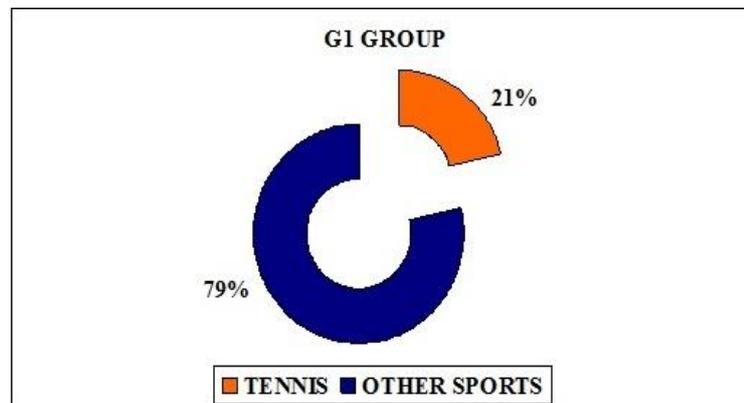


Figure 1. Results for G1 group (for which the subliminal stimuli were represented by a tennis player performing forehand and backhand strokes) – Percentages regarding the choice of the investigated stimulus

Analysis of the results shown in Figure 1 reveals that 21% of G1 participants have chosen tennis, as a subliminally perceived sports branch.

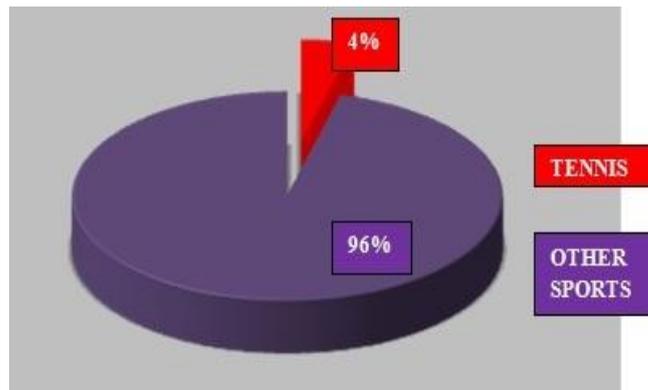


Figure 2. Results for G2 group (for which the subliminally displayed messages were represented by the picture of a person sitting in front of a computer) – Percentages regarding the choice of the investigated stimulus

Analysis of the results shown in Figure 2 reveals that 4% of G2 participants group have chosen tennis, as a subliminally perceived sports branch.

A previous study conducted by Predoiu (2016, pp. 160-162) regarding the effects of subliminal messages on sports performance has highlighted that the use of subliminal messages would not directly lead to improved sports performance; however, manipulating behaviour through familiar subliminal messages, which are linked to the pre-existing background of athletes (for example, technical and tactical executions), can make behaviours more probable than before (balls were sent by athletes near the delimited target areas, but not in the target areas). We can corroborate the obtained results with those existing in the literature.

In an experiment, Wakins (1973) exposed a group of subjects to the visual subliminal message “Drink Coke!” At the end of this exposure, participants had to self-assess (on a scale) both their level of thirst and preference for Coca-Cola from a list of drinks. It was found that the sensation of thirst was two times higher than in the control group. However, participants in the experimental group who had been exposed to subliminal stimulation did not show any significant attraction to Coca-Cola compared to other beverages (Vokey & Read, 1985).

In our study, we can state that subliminal messages have influenced behaviour: 21% of G1 athletes chose (from the given list) the message they had previously perceived at the subliminal level.

Discussions and conclusions

Based on our research and in accordance with the first hypothesis, we can say that the developed procedure allows communication with the unconscious level. This was revealed by the fact that, in the case of G1 group (for which the subliminal stimuli were represented by a tennis player performing forehand and backhand strokes), the percentage of those who chose the subliminally perceived sports branch of tennis was 21%, compared to G2 group (for which the subliminally displayed messages were represented by the picture of a person sitting in front of a computer), who chose the investigated stimulus (tennis) at a rate of 4%. The difference of 17% between the two experimental situations may raise the interest of researchers.

According to hypothesis 2, we can assert that, starting from the procedure initiated in this study, exposure to subliminal messages leads to processing in the absence of awareness, i.e. implicit perception and memory, which can be highlighted by behaviour.

Even if the percentage obtained for G1 (21%) is superior to that for G2 (4%), we believe that visual subliminal messages with short-term exposure (4 minutes) are only partially processed, because 79% of athletes have circled other sports branches.

The psychophysical state of participants during subliminal induction procedures may cause variations in their ability to process relevant data. Conversation and observation (as research methods) were used before and during subliminal induction procedures, supporting the value of our study. The research was also limited by the selected sample: size, age, activity (participants were practising physical activities). Different results could be obtained in a different setting. The chosen video is another limitation of the research. According to Ruști (2005), the video (as an aesthetic message) for which the option is made should trigger pleasant emotions for the participants, because pleasant emotions triggered by the aesthetic message open special gates in the subconscious (the information gets easier into the abyssal areas of the human being). Therefore, further research is needed, which also takes into account this variable – each participant should have his/her own video that generates positive emotions, facilitating

the immersion of subliminal messages into the deep structures of the psyche. The issue of subliminal messages is still open, the views of specialists regarding the effectiveness of visual or auditory subliminal messages being often contradictory.

Authors' Contributions

All authors contributed equally to this study and should be considered as main authors.

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PILATES IN THE LEISURE MOTOR ACTIVITIES OF ADULTS

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Abstract. *Practicing various leisure physical activities represents a beneficial way to model the motor, psychological and social personality of the individual. Among the many motor activities practiced by adults in their leisure time, Pilates gymnastics is increasingly used. In this paper, we started from the premise that a population informed about the benefits of practicing leisure motor activities would properly develop its motor personality and consciously improve its physical condition. In order to get feedback on the knowledge of adult people about the Pilates method, we conducted a questionnaire survey on the www.isondaje.ro/sondaj/483265536/ website. The questionnaire consists of 13 items with closed or open response variants. The respondents to our questionnaire were 147 adult people, with an average age of 33 years. Analysis of the results was done by the statistical method, calculating the percentage per response for the entire sample. The findings of the study revealed a satisfactory level of information on the characteristics and benefits of practicing Pilates motor activities.*

Keywords: *Pilates method, leisure motor activities, questionnaire.*

Introduction

Promoting leisure motor activities is supported by national and international policies, thus recognizing their role as an important health factor (Petru, 2016).

Motor activities practiced by adults in their leisure time are beneficial to health from both the physical and mental points of view. They remove the fatigue accumulated at work/school, create an overall sense of wellbeing and also represent socialisation tools. Through the rational and organised use of leisure time, personality can be shaped in the idea of permanent education (Brîndescu, 2010).

By practicing a variety of leisure physical exercises, one can develop the feelings of freedom, release from negative energies accumulated during work, socialisation and collaboration (Balint, 2007, p. 7).

Consequently, by their recreational and comforting nature, these exercises also bring educational, cultural, intellectual and behavioural pluses. Practicing various leisure-time motor activities positively influences the components of personality and self-image by improving the knowledge of one's own body and its ability to move (Bota, 2006, p. 119).

Various studies have also confirmed the impact of physical activities on interpersonal relationships. They emphasise the positive role of physical activities in gender interaction, professional and even social success (Golu, 2010, pp. 244-246).

Other studies highlight the effects of motor activities on the functionality of different body systems, as well as on memory and the balance between biological and chronological age (Neagu, 2016).

Among the many motor activities practiced by adult people in their leisure time, Pilates gymnastics is increasingly used. Participants have understood the importance of knowing their own body, the role of physical exercise and its effects on the body (Smith, Kelly, & Monks, 2014, p. 50).

The Pilates exercise system has become a fitness activity after 2000; prior to this year, it was mainly used in the art of dance. Initially approached with timidity by the female gender, this form of intelligent gymnastics has started to arouse the interest of the male gender, too.

Recognised for the benefits to the body from both the perspective of physical fitness and the improvement of motor performance, the method has also become an excellent complementary training means in different sports branches (Tudor, 2012, p. 71).

The method promoted by Pilates introduces the notion of "contrology" in motor activity (Pilates & Miller, 2010, pp. 15-19). This concept focuses on the complete coordination between body, mind and spirit. The goal pursued is to gain control over the body by repeating sets of physical exercises specific to the gymnastics field. The intention is to perform coordinated movements at a natural individual pace that will subsequently manifest in all types of motor activities.

Premise and purpose

We started from the premise that a population informed about the benefits of practicing leisure motor activities would properly develop its motor personality and consciously improve its physical condition.

In order to get feedback, we aimed to investigate the opinions of adult population on the Pilates method in general and the knowledge of its benefits to the human body.

Material and methods

The research method used was the questionnaire survey. This was done on www.isondaje.ro after creating a user account and password. The questionnaire was published on the website on 8 February 2017 and could be accessed at the following link: www.isondaje.ro/sondaj/483265536/. The link was distributed on all available channels (e-mail, Facebook etc.) so that it could be accessed by the largest possible number of people practicing/ willing to practice/ not practicing constantly Pilates programmes during their leisure time.

The questionnaire consists of 13 items with closed or open response variants. For closed responses, a 5-level scale was used as follows: a. strongly disagree; b. disagree; c. undecided; d. agree; e. strongly agree.

The questionnaire items were:

1. Do Pilates exercises represent a type of beneficial movement for the body?
2. Do Pilates exercises contribute to raising awareness and improving body posture?
3. Are Pilates exercises performed on specific machines more advantageous than mat exercises to improve physical fitness?
4. Does the practice of Pilates exercises relieve spinal pain?
5. Is it an advantage that Pilates exercises can be practiced by anyone at any age?
6. Do you think that Joseph Pilates' statement: "In 10 sessions you will feel the difference, in 20 sessions you will see the difference, and in 30 sessions you will have a different body", is a myth or a reality?
7. Do top athletes use the Pilates method for recovery after exercise, muscle toning, or both?
8. Can Pilates become a lifestyle and a form of exercises to be practiced on a daily basis?
9. What part of the day do you think is most suitable for practicing exercises: morning, afternoon, evening?
10. Are Pilates exercises recommended for pregnant women?
11. Do Pilates exercises provide physical benefits that help easier delivery?
12. Do Pilates exercises contribute to weight loss by changing body composition?
13. What score do you award, on a scale of 1 to 10, to the following benefits derived from practicing Pilates exercises? Increases muscle tone. Decreases the level of stress. Develops joint mobility. Improves blood circulation. Provides energy and vitality for the whole body.

Each participant was assured that all responses would be used for scientific purposes, without allowing their identification, and the information would not be transmitted to another organisation.

For an easier presentation and interpretation of the results, we grouped the responses on 3 topics of interest:

- a) What is the level of information on the characteristics of Pilates method among the interviewed people?
- b) How is the practice of Pilates exercises perceived by the adult population?
- c) How do respondents assess the benefits of these exercises to the body?

Analysis of the results was done by the statistical method, calculating the percentage per response for the entire sample.

Results and discussions

A number of 147 people responded to our questionnaire.

As expected, most respondents are female (75.5%, 111 out of 147). It is known that accessing such programmes is less usual among men, they preferring exercises on the machines in fitness gyms.

Regarding the age of the respondents, the average is 33 years (16.3% between 16 and 24 years, 46.9% between 25 and 34 years, 21.1% between 35 and 44 years, and 15.6% between 45 and 54 years).

- Topic a): What is the level of information on the characteristics of Pilates method among the interviewed people?

The responses grouped around this topic are shown in Figure 1 and refer to questions 1, 2, 4, 11 and 12. As seen in the figure, no negative responses, such as strongly disagree or disagree, have been recorded.

Question 1: in 94.6% of cases, Pilates is considered to be a type of beneficial movement for the body.

Question 2: most respondents agree that Pilates exercises contribute to raising awareness and improving body posture (97.3% of them agree or strongly agree with this statement). These views confirm the literature data and Pilates' vision of the concept of "contrology" (Pilates & Miller, 2010, p. 18). At the same time, 88.4% of respondents strongly agree that these exercises relieve spinal pain and only 8.8% are undecided. In a previous

research study, we have practically demonstrated the reduction of painful symptoms in the lumbar spine and coxofemoral coxarthrosis (Ispas & Macovei, 2016).

Question 11: over half of respondents (64.6%) agree or strongly agree that Pilates exercises provide physical benefits that help easier delivery, and only 34.7% are undecided.

Question 12: almost three-quarters of respondents (74.1%) agree or strongly agree that these exercises contribute to weight loss by changing body composition. Regarding the improvement in body mass index, there are research studies that have practically proven this aspect (Segal, Hein, & Basford, 2004); Aladro-Gonzalvo et al., 2012; Ispas, Macovei, & Zahiu, 2017).

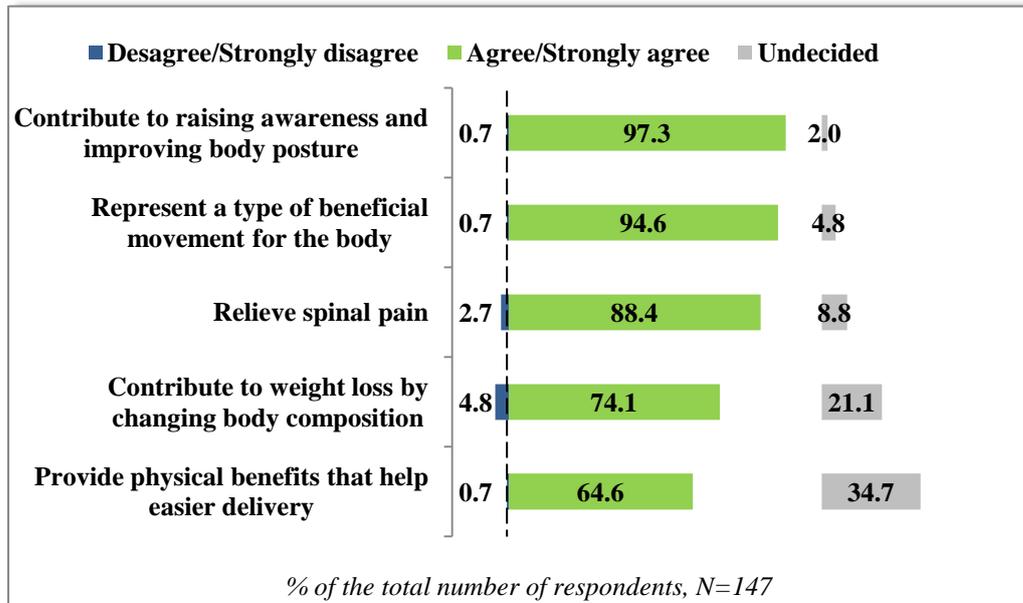


Figure 1. Results for the items related to recognising the characteristics of Pilates method

- Topic b): How is the practice of Pilates exercises perceived by the adult population?

The questions grouped around this topic are the following: 3, 5, 6, 7, 8, 9 and 10.

The responses to question 3, whether Pilates exercises performed on specific machines are more advantageous than mat exercises to improve physical fitness, show that 74.8% of the interviewed people agree (34.0%) or strongly agree (40.8%) with the statement, 23.1% are undecided, and only 2% do not agree with it (Figure 2).

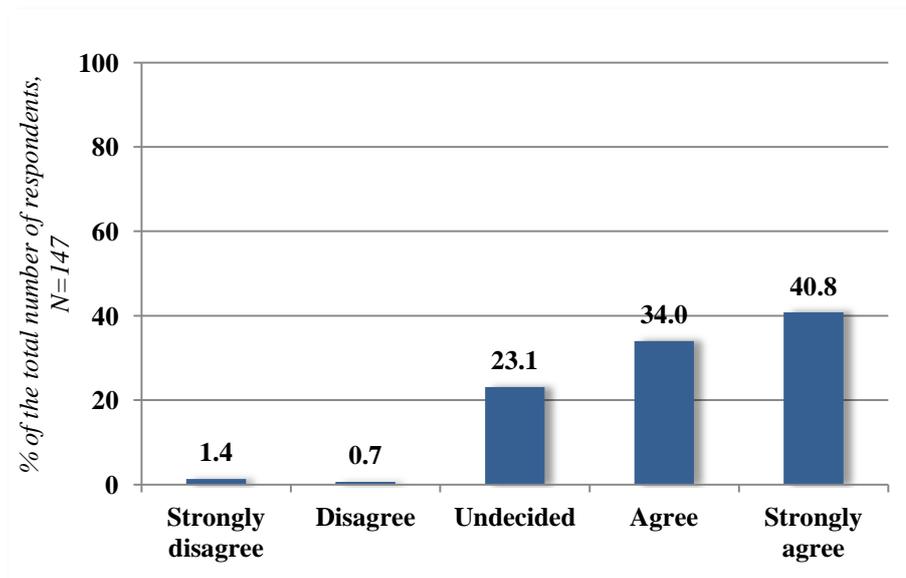


Figure 2. Results for item 3: Are Pilates exercises performed on specific machines more advantageous than mat exercises to improve physical fitness?

In our opinion, these results reveal that most respondents practicing Pilates have already attended programmes on specific machines, which provide a variety of opportunities and require better control of the muscles due to the accessories used.

The responses to question 5, referring to the possibility of practicing Pilates exercises at any age, indicate agreement with the statement (three-quarters of respondents – 76.9%, strongly agree and 21.8% agree). Only 0.7% are undecided and 0.7% disagree with it (Figure 3). Obviously, the question was about the adult age stages, so we agree with the view of the respondents. We also highlight that Pilates exercises can be an excellent option for the motor activities of elderly people. In this age group, raising awareness of bodily ego, organising control and maintaining suppleness are crucial to provide optimal physical fitness (Marcu & Tarcău, 2010, pp. 57-59). Exercises involving sensory awareness, body awareness, gesture dynamics, postural muscle training and permanent body balance control are necessary. All these issues are found in the concept of “contrology” (Pilates & Miller, 2010, pp. 18-19).

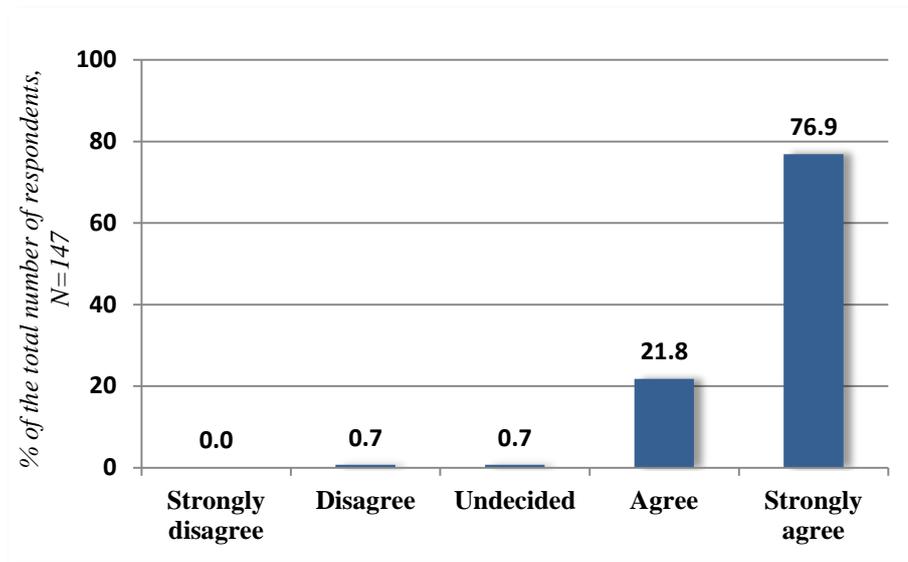


Figure 3. Results for item 5: Is it an advantage that Pilates exercises can be practiced by anyone at any age?

Regarding Joseph Pilates' statement on how the body changes following the practice of Pilates programmes (question 6), it is favourably assessed by most respondents. The results in Figure 4 show that 31.3% strongly agree and 42.2% agree with it. Only 0.7% strongly disagree, 2.0% disagree and 23.1% are undecided.

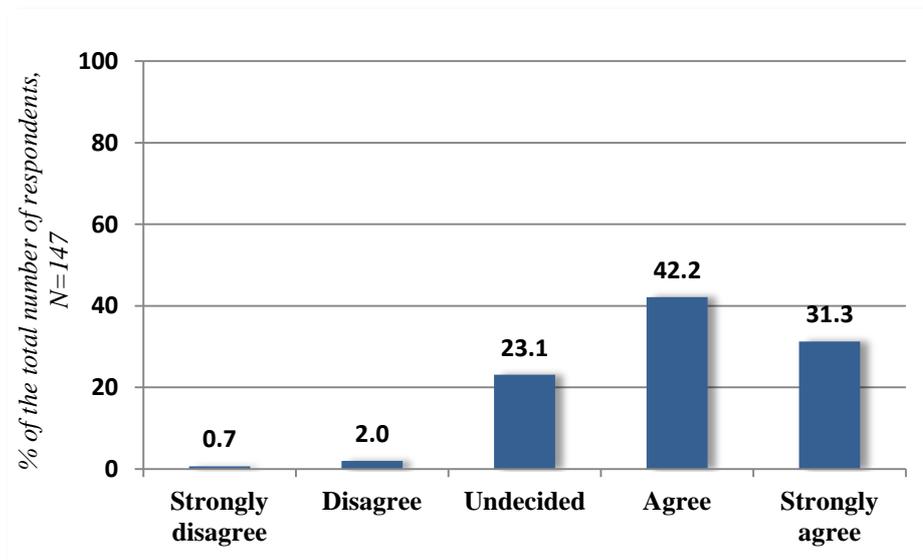


Figure 4. Results for item 6: “In 10 sessions you will feel the difference, in 20 sessions you will see the difference, and in 30 sessions you will have a different body” (Pilates)

Figure 5 shows the responses to question 7: Do top athletes use the Pilates method for recovery after exercise, muscle toning, or both? It is known that more and more performance athletes use Pilates programmes as complementary training means. In this regard, we were interested in seeing the purpose of their use. Most respondents (81.65%) believe that top athletes use the Pilates method for both post-exercise recovery and muscle toning, the percentages being shown in the figure below.

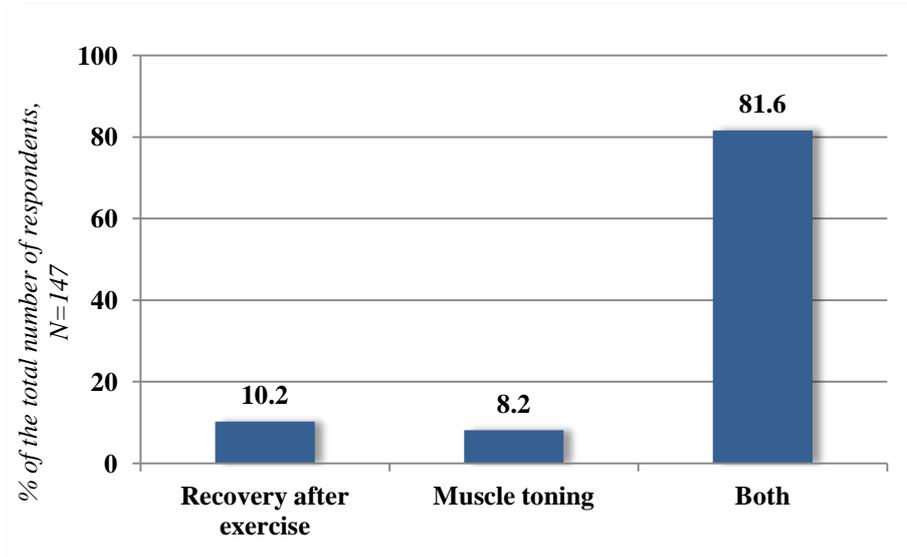


Figure 5. Results for item 7: Do top athletes use the Pilates method for recovery after exercise, muscle toning, or both?

As for question 8, asking whether Pilates can become a lifestyle and a form of exercises to be practiced on a daily basis, most respondents agree with this statement (55.8% strongly agree, and 35.4% agree). Only 0.7% of them disagree with it, and 7.5% are undecided, according to the percentages shown in Figure 6. The result of the interview reveals that the majority of the population appreciates the benefits of this motor activity to the body.

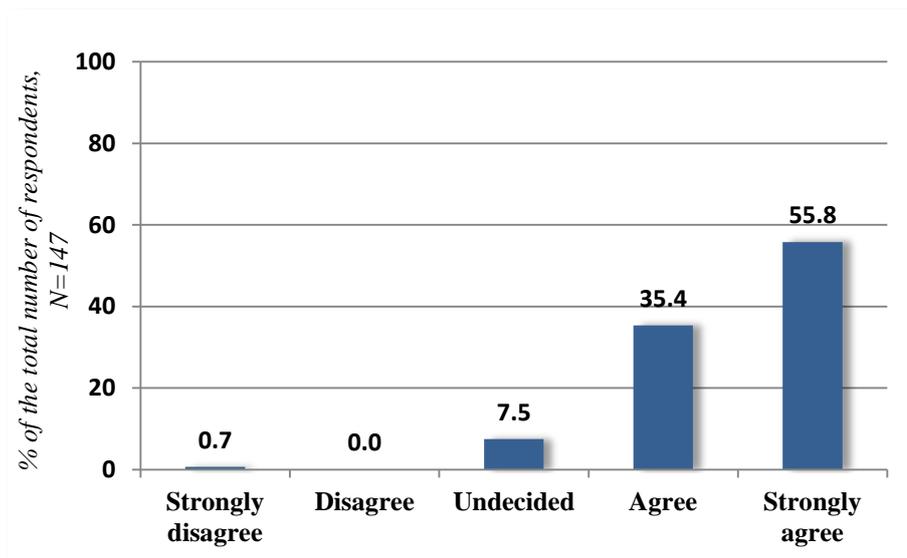


Figure 6. Results for item 8: Can Pilates become a lifestyle and a form of exercises to be practiced on a daily basis?

Question 9 refers to the part of the day that is most suitable for practicing exercises: morning, afternoon, evening? The respondents indicate two time intervals: in the evening, between 17:00 and 20:00 (26.6%), and in the morning, between 7:00 and 9:00 (21.8%). Their options are shown in Figure 7. It should be noted that the choice

of different periods of the day for practicing these motor activities depends on their daily working hours, family obligations, resting needs etc.

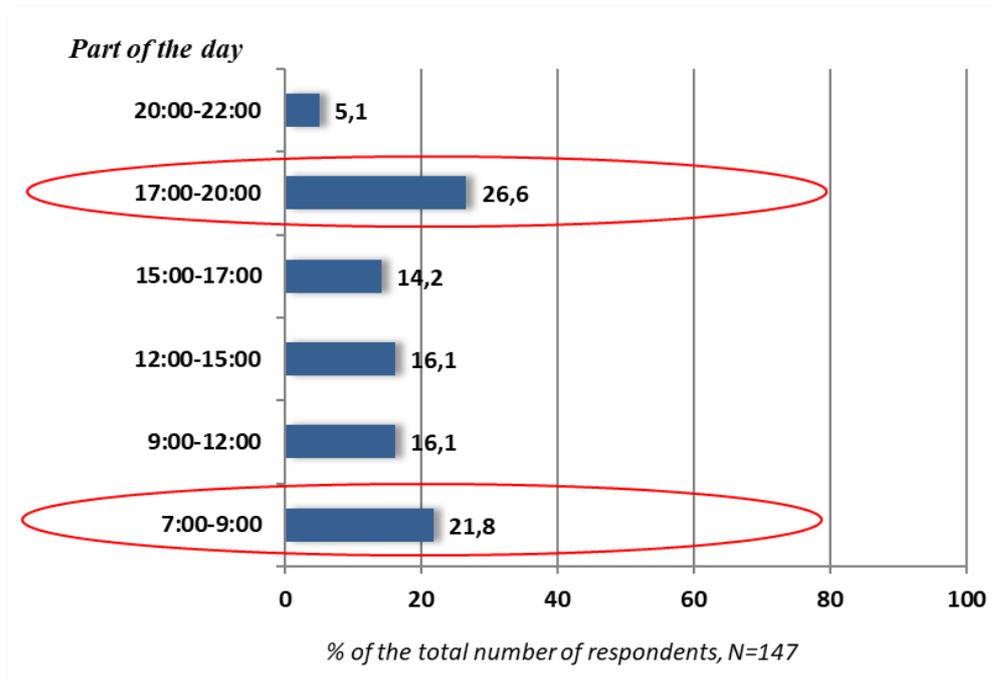


Figure 7. Results for item 9: What part of the day do you think is most suitable for practicing exercises: morning, afternoon, evening?

Question 10, referring to the recommendation for pregnant women to practice Pilates exercises, has been asked because this form of gymnastics adapted to the mentioned physiological state is more and more sought. The responses are also consistent with those to question 11 discussed within the first topic. In the case of our respondents, most of them believe that Pilates exercises are recommended for pregnant women (34.7% agree, and 42.2% strongly agree), according to Figure 8. A percentage of 20.4% represents undecided respondents, while 1.4% disagree and 0.7% strongly disagree. The literature data recommend Pilates exercises for pregnant women, because they have a beneficial effect on the pelvic area and lower abdomen, providing muscle toning and joint mobility. It is important for pregnant women to be assisted by Pilates instructors (*Pilates în sarcină*, 2017; *Exercițiile Pilates și sarcina*, 2015).

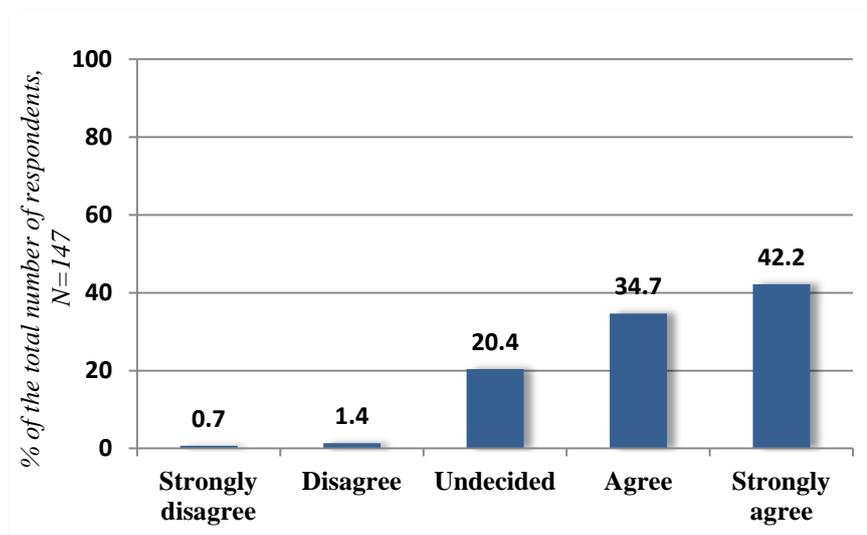


Figure 8. Results for item 10: Are Pilates exercises recommended for pregnant women?

- Topic c): How do respondents assess the benefits of these exercises to the body?

This topic includes question 13.

Based on the assessments made by the interviewed people, the main benefit of Pilates exercises is the development of joint mobility, with an average score of 8.84 on the scale of 1 to 10. On the 2nd place in this ranking, we find the benefit “Provides energy and vitality for the whole body”, with an average score of 8.65, and the 3rd place is taken by “Decreases the level of stress”, with an average score of 8.42. “Increases muscle tone” is on the 4th place, with an average score of 8.39, followed by “Improves blood circulation”, with an average score of 8.37. It is worth noting that our subjects have awarded high scores to the Pilates benefits, which reveals that they possess knowledge and awareness (Figure 9).

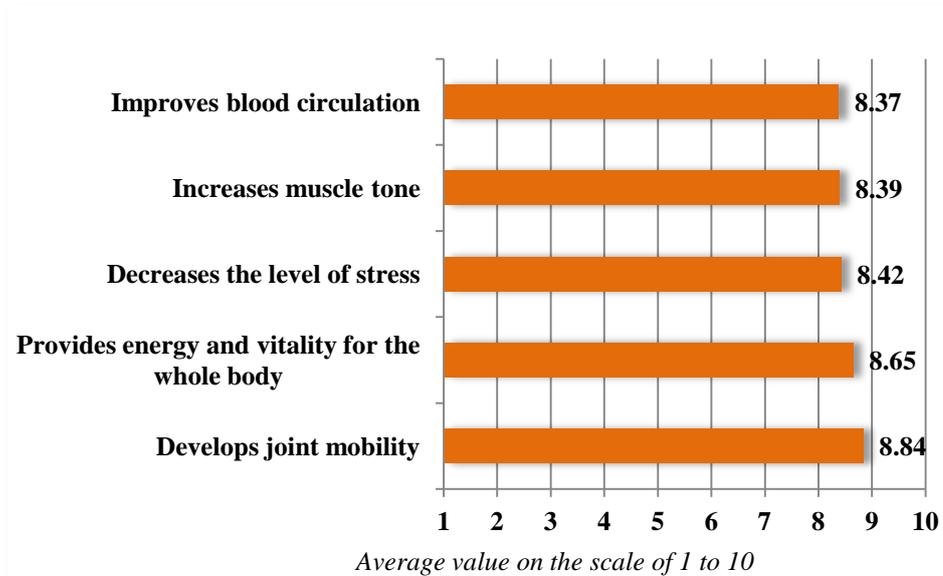


Figure 9. Results for item 13: What score do you award, on a scale of 1 to 10, to the following benefits derived from practicing Pilates exercises?

All these issues are found in the principles of Pilates method and are validated through the correct assessment made by the investigated population (Silver, 2011, pp. 11-25).

Conclusions

The responses of the interviewed people have revealed a satisfactory level of information on the characteristics and benefits of practicing Pilates activities. This is also supported by the activity performed in fitness gyms, where Pilates programmes are increasingly used.

The method is perceived as a form of movement that improves physical condition, helping to shape body composition and posture, develops joint mobility and tones the muscles, providing energy and vitality for the whole body.

We believe that the responses given by the investigated population have provided positive feedback on the impact of Pilates method, which will help us develop Pilates programmes on specific machines according to the requirements and needs of each performer.

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NEUROMOTOR RE-EDUCATION AT THE SENSORY AND KINAESTHETIC-POSTURAL LEVELS IN THE ICP (INFANTILE CEREBRAL PALSY) CASE

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Abstract. *Infantile cerebral palsy is the most frequent cause of disability in childhood. It affects a lot of functions, from global mental retardation and profound motor anomalies up to isolated dysfunctions of walking, cognition, speaking, language and perception. As is known, re-education is a new integral and systematic process intended to compensate for the shortcomings of previous education, whose effects have been lost as a consequence of trauma, infirmity or maladaptation. Only by including physical activity in the recovery process, we can reach our aims in the rehabilitation of infantile cerebral palsy. The treatment applied to children with ICP/CMI (Infantile Cerebral Palsy/Cerebral Motor Infirmity) should be applied precociously and appropriately to each case, meaning that it should be customised, consequent, perseverant, well dosed and complex. It has not been found yet (and it is hard to believe it will ever be) a certain way to treat infantile cerebral palsy – it depends on each case to find the best way to deal with it.*

Keywords: *infantile cerebral palsy, cerebral motor infirmity, spasticity, sensory disorder.*

Introduction

The preoccupation for the child with infantile cerebral palsy is present nowadays. The cases are treated very carefully, and the research in the field has become more extensive. Starting from the cases observed and with which we have come into contact, as well as from the desire to help, it was necessary and topical for us to approach the theme of this paper. We considered that thus we could bring our contribution to helping children with ICP to return to “normality”.

Re-education, according to the analysis achieved by Pasztai (2004, p. 18), is considered a new integral and systematic process intended to compensate for the shortcomings of previous education, whose effects have been lost as a consequence of trauma, infirmity or maladaptation.

The set of measures are designated to allow a subject reached by a disabling condition to regain partially or almost totally the normal use of his/her potential.

For the therapeutic rehabilitation activity, Căciulan (2011, p. 11) notes that it is particularly important to establish a diagnosis as soon as possible, with the possibility of quickly finding the proper treatment, so that to prevent the formation of incorrect motor habits and the consecutive vitiation of proprioceptive impulses. The precocity of therapeutic intervention is decisive for obtaining an optimal result. The first to examine the child is the neonatology physician, and then the paediatrician. Neuromotor deficiency must be recognized a long time before being visible to parents.

Re-education through physical therapy and re-adaptation of the child with neuromotor disabilities can only be conceived through teamwork.

Topic addressed

Infantile cerebral palsy is the most frequent cause of disability in childhood, affecting between 2-2.5 per 100 newborn babies. The condition can be presented under a large spectrum of clinical manifestations, from global mental retardation and profound motor anomalies up to isolated dysfunctions of walking, cognition, speaking, language and perception.

Complete assessment of the neurodevelopment of the child with cerebral palsy is performed by a multidisciplinary team of experts and will contain the examination of clinical and functional status, aetiological risk factors, associated manifestations and environmental factors that influence their participation and quality of life (Roşulescu et al., 2009, p. 90).

Functional integration of motor activities

Performing voluntary motor acts necessitates the morphofunctional integrity of all nervous structures and effector muscles.

When performing voluntary motor acts, several stages are completed, as follows:

- A. cortical “designing” of the movement;
- B. establishing the movement sequences and prospecting the conditions in which they will be performed;

- C. sending the orders appropriate to the movement purpose to the effector muscles;
- D. temporal and spatial control of movement execution;
- E. adjusting the muscular contraction strength to the motor act requirements;
- F. modelling voluntary motor activity according to the conditions appeared during the action development;
- G. establishing the continuation or interruption of motor activity.

Therefore, when performing any voluntary motor activity, the brain cortex ensures coordination as regards the start, development and end of the motor act.

Through the brain cortex, some motor skills get an automatism or “dynamic stereotype” character, as a consequence of repeating the motor act for a large number of times.

Through the connections between different motor cortical sensitive-sensory areas, specialised motor acts with a practical character are performed (writing, speaking, singing etc.).

Complexity of treatment for the child's neurological disorders

The treatment for children with ICP/CMI (Infantile Cerebral Palsy/Cerebral Motor Infirmity) should be applied precociously and appropriately to each case, meaning that it should be customised, consequent, perseverant, well dosed and complex.

The treatment for children with neuromotor disabilities involves examination by an inter-disciplinary team in order to identify all their deficiencies.

The complex treatment consists of: physical treatment (physical therapy, occupational therapy, cryotherapy, electrotherapy, hydro-physical therapy), drug treatment, orthopaedic-laying devices, surgical treatment and treatment with hyperbaric chamber.

According to Căciulan (2011, p. 116), physical treatment has several objectives:

- adopting postures through which to obtain relaxation of contracted muscles and correction of abnormal positions;
- preventing muscle-tendon reactions by the suppression of tonic reflex activity;
- inhibiting muscle hypertonia (spasticity) and associated reactions;
- facilitating controlled motor activity;
- obtaining and consolidating balance and support reactions;
- increasing awareness of the body schema and stimulation of motor control;
- re-educating the limb grip strength and manual ability.

The methods of neuromotor recovery use these processes of inhibition and/or facilitation in order to accelerate voluntary motor control and global movements. The information of exteroceptive, proprioceptive, labyrinth and vestibular nature, as well as the purpose of education and formation of automatic movements, which stay at the base of the voluntary active order, are sent to neuromotor centres with functional disorders through physical therapy programs.

Occupational therapy represents, according to Dan (2005, p. 63), a special important link within the rehabilitation treatment and consists in using several forms of attractive games for children (games that involve a certain type of movements for the upper and/or lower limbs, attention, concentration, sensory stimulation, spirit of observation, sometimes intelligence etc.), but also some appropriately selected lucrative activities, such as pottery, sewing, knitting, binding, ceramics, carpentry, drawing, painting, sculpture, dance, theatre etc.

Cryotherapy, as Căciulan says (2011, p. 139), consists in the local application of ice, carbonic acid or methyl chloride, simultaneously with performing of some manoeuvres of pressure and friction. Besides spasticity decreasing, cryotherapy has other effects, namely: decreasing surface pain, decreasing nervous conduction, decreasing inflammation, preventing post-traumatic haemorrhage.

Electrotherapy is a conservative type of physical therapy, which uses different forms of electrical currents (continuous, low-frequency or average-frequency currents), but also different forms of energy derived from the high-frequency currents (short waves, microwaves, ultrasounds, infrared or ultraviolet radiations and laser) or the low-frequency currents (low-frequency magnetic fields).

Among the different forms of currents, the most often used, in the case of ICP/CMI (Infantile Cerebral Palsy/Cerebral Motor Infirmity), are the low-frequency currents, ultrasounds and low-frequency magnetic fields (magnetotherapy).

Hydro-physical therapy represents a method of performing physical exercise in water and using the advantages of mechanical factors provided by the aquatic environment through the thermal factor (if warm or thermal water is used – hydro-thermotherapy) and chemical factor (if mineral waters and seawaters are used).

Drug therapy – complex treatment cannot be dispensed with the prescription of some drugs, either with a specific or general trophic character.

Anti-seizure medication is compulsory when appropriate, being recommended by the neuropsychiatrist, depending on the severity of the case.

Neuroleptic medication is recommended in order to eliminate the child's psychotic manifestations or to adapt to the environment or organically.

Anti-contraction medication has the role to produce muscular relaxation by removing or helping to decrease spasticity.

Neurotrophic medication is used for the stimulation of muscle and nerve cells.

Orthopaedic-laying devices – orthopaedic treatment is necessary and compulsory in order to maintain the progress obtained as a consequence of physical therapy sessions. The orthopaedic means used are: slings for maintaining the corrective position of upper and lower members, both during the day and night rest; a sloped plane for the prone position; support for maintaining the supine position; trotte-lapin for maintaining of the kneeled position; vertical devices for maintaining the upright position; canvas corsets for the position of the spine; orthopaedic boots, their use being compulsory in order to ensure ankle joint stability.

Surgical treatment – over time, spasticity has been a concern for both clinicians and neurophysiologists, who, through their clinical observations and experimental studies, contributed to elucidating its physical and pathological mechanisms, to precisely shaping its clinical manifestation and functional consequences by a rigorous assessment of the degree of dysfunction. This condition currently concerns several medical specialties (neurology, neurosurgery and orthopaedics). It represents a generous pretext for interdisciplinary clinical studies.

The notion of “therapeutic algorithm of spasticity” is inseparably related to the idea of collaboration between specialties, and the whole effort is related to objective righteousness, improving the quality of life, social integration and decreasing the costs of care.

Treatment with hyperbaric chamber – this is a form of therapy through which the child inhales pressurised oxygen in a hyperbaric chamber; it is based on the theory according to which nerve tissue in the areas nearby the lesion can be reactivated to operate normally. In this respect, recent studies have been performed, but without beneficial results. Increasing the partial pressure of oxygen in tissues has many beneficial effects, first, on the fast recovery of bone traumas, but also of cerebral lesions, and second, on cerebral hypoxia.

Proprioceptive neuromuscular facilitation in child recovery

The notion of “proprioceptive neuromuscular facilitation” refers to both the relief and encouragement of voluntary motor response by stimulating the muscle and tendon proprioceptors, but also the external receptors.

Kabat concept is based on the idea that using the proprioceptive system to initiate and improve movements can be decisive, taking into consideration its particularly high distribution (muscular fascia, tendons, capsule-ligament structures of the joints).

Starting from Sherrington's papers of neurophysiology, Kabat (2006) issues the techniques of proprioceptive neuromuscular facilitation, which he defines as “methods of relieving the neuromuscular response through stimulation of the proprioceptors”.

More than once, the concept of “neuromuscular facilitation” was criticised regarding its application to neurological disorders characterised by the presence of spasticity; using it with the child who can cooperate actively does not necessitate high-resistance opposition, but just movement orientation in its way. What situates it among the highly useful physical therapy methods is the fact that the results are quickly obtained.

Conclusions

In its evolution, neuromotor re-education has been based on the research in neurophysiology, trying to obtain movement restitution to normal or almost normal, external stimulus – which results either from the periphery, on ascending paths (muscular or cutaneous origin), or from the central level, on descending paths (motivational, consciousness-related or emotional one), determining the discharge of a limited number of neurons.

Any stimulus that will decrease the number of activated neurons will decrease or inhibit the motor response. However, some stimuli will recruit additional neurons and will facilitate the motor response.

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THE IMPACT OF STUDENT INTEREST ON THE ENVIRONMENT AND STUDENT EXPERIENCE WITHIN A PHYSICAL EDUCATION CLASS

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Abstract. *Physical education must create educational opportunities that encourage students to take responsibility for their own work, promote teamwork and cooperation. It should inspire students to ask questions, pursue their own aspirations, establish goals and develop their ability to perform. Student interest can be classified into situational or individual interest. Situational interest is a short form of interest, while individual interest is the later phase of interest. A student who has individual interest for a subject will be willing to study it more and for a longer period of time. Teachers can use motivation and student involvement as strategies that influence the climate in the physical education class. Student behaviour is determined and regulated by intrinsic, extrinsic and lack of motivation. The environment influences individual or intrinsic motivation. Physical education teachers should create an environment that supports student motivation and encourages them to see that their participation in the physical education class will determine the atmosphere and value of the experience.*

Keywords: *physical education, interest, motivation, class climate.*

Introduction

The following question was a starting point for this study: What role does interest play in a student's experience and performance during class or throughout the experience with Physical Education, and how can a teacher help maintain student interest?

According to Renninger (2000), interest is "a psychological state of having an affective reaction to and focused attention for a particular content and/or the relatively enduring predisposition to re-engage particular classes of objects, events, or ideas".

Interest may have an impact on motivation, which, according to the DEX (2009) definition, is the totality of motives and drives (conscious or not) that influence someone to carry out a certain task or seek the achievement of certain goals.

Motivation has two components:

- the motive, which represents the intellectual cause of an action;
- the drive, which represents the affective part of the action.

It is clear that there is an intense preoccupation with the study of interest and its impacts, since a correlation has been observed between interest and student involvement in a class. Some theories (Krapp, 1999; Krapp, Hidi, & Renninger, 1992; Renninger, 2000) classify interest in situational or individual interest.

Situational interest is:

- a short form of interest;
- generated by a particular event or situation;
- generated by the environment or context.

Personal or individual interest:

- is a long-term form of interest;
- is a later phase in the evolution of interest;
- leads to an increase in attention, perseverance and learning.

Hidi and Renninger (2006) describe their theory and explain that interest is a psychological complex that has four phases and that students can transition through these phases in a sequence depending on the experiences to which they are exposed, as well as on their personal characteristics. The factors influencing the movement between interest phases include:

- The situation that initiated the interest;
- The maintenance of the situation that initiated the interest;
- The appearance of individual interest;
- Developed individual interest.

Situational interest appears as a psychological interest when a student perceives a match between an activity and his or her personal abilities and understandings. Situational interest can be planned, created and manipulated

by the teacher. Studies have shown that a teacher has a clear impact on the student's physical and cognitive involvement in the class, yet has a limited impact on the achievement of results (Zhu et al., 2009).

The appearance of individual interest is a long-term form of interest in which students are involved in a lesson's content (Hidi & Renninger, 2006). It is a phase of interest that has cognitive and affective implications, which can be influenced by contextual or environmental factors such as teachers, peers and the reception of encouragements from these individuals. This form of interest has long-lasting implications compared to situational interest. Individual interest is a psychological disposition that is part of the selection of and involvement in an activity or action, and it is based on an individual's opinions about the understandings, values and beliefs of such an activity. It is believed that this interest develops while a student is constantly exposed to an activity in a particular environment that supports interest development.

Developed individual interest is the most stable form of interest, and students who experience this form of interest establish a wider range of positive experiences than students in the earlier phase, when individual interest is just beginning to appear.

The major difference between the two forms of individual interest can be made when the student is faced with negative experiences. It will be more likely for the student in the first phase of individual interest to give up on the activity.

Shiefel, Krapp and Winteler (1992) state that personal interest motivates a student, allows for repeated learning and improvement in a task, promotes the long-term accumulation of understandings and also leads towards lifelong learning. Personal interest has a powerful influence on the decision and perseverance to learn. Interest can be developed through questions, profound thinking, meaningful conversations about a subject and through real-world applications and connections.

It is observed that many young individuals are not interested in Physical Education classes and are not physically active. This increases the risk of the appearance of chronic diseases. Therefore, it is important for students and adolescents to adopt an active lifestyle. It is unanimously accepted that Physical Education classes influence students to regularly participate in the practice of physical exercise. There are many studies that have provided evidence that Physical Education can determine individuals to be physically active and lead to healthy lifestyle choices (Biddle & Chatzisarantis, 1999; Digelidis et al., 2003). Additionally, students who are motivated to participate during Physical Education classes are more inclined to become involved in athletic activities during their free time too.

Sallis and McKenzie (1991) state that a positive experience in Physical Education can influence students in adopting an active lifestyle, which can lead to an improvement in the overall health of the general population. Consequently, the development of motivation in adolescents is a crucial goal in the context of contemporary Physical Education classes.

There are two theories that can explain student motivation within Physical Education classes: the one developed by Nicholls (1984), which follows achievement-goal theory, and Ryan and Deci's (2000) self-determination theory.

When a student defines failure and success in comparison to the performance of other students, the "ego" orientation is developed, while the use of evaluation criteria with personal references allows for the development of the "task-mastery" orientation.

These two orientations do not oppose each other, but can intersect during an activity, though they cannot be experienced at the same time. In other words, individuals who are in the "task-mastery" orientation perceive their ability to achieve the task when they can develop new qualities, when they become more competent in a particular activity and skill, or when they apply maximum effort. By contrast, individuals who are "ego-oriented" perceive their ability to achieve a task only when they compare themselves or compete with others. Within the context of physical activities, the "task-mastery" orientation is positively associated with intrinsic motivation and positive affect. "Self-determination" theory starts from the idea that behavioural regulation is influenced by three types of motivation: intrinsic, extrinsic and amotivation.

Intrinsic motivation is when the individual finds the involvement in an activity to be pleasurable. This is the highest level of self-determination and refers to the situations when individuals are personally involved in physical activities that they find highly interesting, because they experience pleasure and joy and because these activities offer them opportunities for learning and growth (Kalaja et al., 2010; Ntoumanis, Barkoukis, & Thøgersen-Ntoumani, 2009; Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010). When individuals are motivated and experience interest in this activity, they are more confident in their abilities.

Extrinsic motivation is when students participate in an activity because they adamantly seek its completion rather than the activity itself. This includes the process of seeking out social recognition.

There are four types of extrinsic motivation (Deci & Ryan, 1985, p. 34):

- a. External regulation: when behaviour is determined by external factors (punishments, rewards);
- b. Introjected regulation: when behaviour is determined by feelings of guilt (for example, “I feel guilty if I do not participate in this activity”);
- c. Identified regulation: when behaviour is self-determined, and the individual perceives certain activities as being part of his or her personal goals (for example, “I participate in the Physical Education class so that I can lose weight”), yet participation is not due to the personal enjoyment of the activity;
- d. Integrated regulation: this is the form that is the closest to intrinsic motivation, but behaviour is still determined by the achievement of a certain personal objective (for example, “I take part in this activity because I want to be healthy”), not because of enjoyment.

Individuals who are intrinsically motivated are more interested compared to individuals who are extrinsically motivated, because they experience the pleasure and enjoyment of being active (Deci & Ryan, 1985, p. 34)

Amotivation is when the student experiences a lack of desire and does not have the intention of getting involved, and refers to the situation when the student does not perceive any connection between the action and its results and hence experiences feelings of incompetence and helplessness.

Certain studies have shown a correlation between intrinsic motivation and goal orientation (Butler, 1989; Ryan, 1982; Ryan & Deci, 1989). Duda et al. (1995) have demonstrated that the differences in goal orientations can affect intrinsic motivation by impacting the perception of competency in the achievement of a task. Even though there are many students who are motivated intrinsically to participate in their Physical Education class, there also are more students who are motivated extrinsically or who lack motivation all together.

Interest and participation in the context of a Physical Education lesson decreases with age (Digelidies & Papaioannou, 1999; Koka & Hein, 2003; Mitchel, 1996). Hence, strategies must be found to inspire students to actively engage in their Physical Education classes and to help them create the habit of remaining active even in their free time. Through the examination of student motivation to engage in Physical Education, determining factors have been unveiled.

The environment in which the student carries out the activity can influence individual motivation. The motivational climate represents the socio-affective conditions within a classroom, which include the interpersonal relationship processes and evaluation methods. These conditions are determining factors, because they can facilitate or impede the expression of certain behaviours during a lesson. According to Ames (1992), a performance climate exists when the teacher values and accentuates the competition between students and when evaluations are made public. By contrast, a mastery climate is developed when the teacher accentuates the importance of the learning process, personal improvement and participation.

Studies have shown that teaching strategies based on helping students develop intrinsic motivation also lead to the accumulation of content understandings. A focus must exist on helping students develop the desire to improve, not by comparing themselves to others, but by simply focusing on themselves.

Research based on situational interest within the Physical Education class has shown the importance of creating tasks that are based on attention, novelty, enjoyment, exploration and challenge (Chen & Darst, 2002; Chen, Darst, & Pangrazi, 1999).

Studies show the importance of encouraging students to create a Physical Education setting that can sustain student motivation and the development of content mastery. Additionally, teachers should provide students with disciplinary strategies based on intrinsic motivation. In this way, students will be encouraged to see that their participation in Physical Education will determine the atmosphere and value of the experience, not the focus on performance, indifference and personal values. Using this perspective, teachers can maximise their students' intrinsic motivation towards Physical Education and amplify the resulting positive learning outcomes.

Topic addressed

The teacher can influence a student's perseverance and level of determination within the Physical Education class by creating a motivational climate. If a climate is created that is oriented towards surpassing personal best rather than competition, students will become more interested in actively participating during the Physical Education lesson. As suggested by Bryan and Solomon (2007), teachers can use strategies that are based on motivation and student involvement in the class. Student behaviour can be influenced by strategies that encourage the students' desire to participate without feeling controlled. Hence, a teaching strategy in which students are given choices seems to have a positive influence on developing intrinsic motivation.

Conclusions

Physical Education means more than just being part of sport teams and participating in different games. It is meant to encourage students to understand the importance of a healthy balanced life. Throughout the years of study, students need to develop their knowledge, their ability to ask questions and reflect to become more responsible, but also to develop interpersonal relationships.

Programs must be developed in order to follow the increased appeal of the Physical Education classes, to empower students in the educational process and give them incentives in the ongoing activity. All of these will improve the students' social skills, will influence in a positive way their physical and motor development and will increase their knowledge about Physical Education and sports.

Therefore, it is important for teachers to establish objectives that seek the development of cooperation between students and the use of strategies that increase a student's decision-making power. Additionally, when they provide feedback, teachers should refer to a student's personal performance rather than the comparison of the performance to that of others.

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PERSONALITY TYPES AND LOCUS OF CONTROL AS FACTORS INFLUENCING AN OPTIMISTIC LIFE ORIENTATION

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Abstract. *Optimism, a largely examined notion in psychology, has a major influence on the quality of life, but the factors that lead to its construction have been less examined. Locus of control and personality types have been analysed as determinants in the structure of an optimistic life orientation. The study focused on 125 participants, both male and female aged between 18 and 55. Participants were asked to respond to a test battery composed of the Rotter Internal-External Control Scale, Myers-Briggs Type Indicator (MBTI) and Life Orientation Test – Revised (LOT-R). Conclusions have shown that locus of control, extraversion vs. introversion dimension and sensitivity vs. intuition dimension have implications on an optimistic life orientation. Therefore, an internal locus of control is associated with a high level of optimism, and extraversion and intuition dimensions are also associated with an optimistic life orientation. This research highlights the importance of educating the dimensions that lead to the structure of a high level of optimism in a way allowing people to develop their resources towards a rich and favourable level of optimistic life orientation.*

Keywords: *life orientation, locus of control, personality types, optimism.*

Introduction

Optimism is more than a pleasant feeling, it has positive effects on the affective, social and professional life (Braconnier, 2014).

People are considered to be optimistic when they attribute problems in their lives to temporality, specificity and externality. Optimism is associated with higher levels of motivation, achievement and physical and mental well-being, as well as lower levels of depressive symptoms. People with a high level of optimism accept life situations as they are and always see the good side. They are calmer in front of the stressors and the events they cannot control (Carver & Scheier, 2001).

Moreover, it has been shown that a high degree of optimism facilitates the general well-being and improves the state of health (Wrosch & Scheier, 2003), but also that optimistic people have increased longevity (Brummett et al., 2006).

In 2009, Gruber-Baldini, Anderson and Shulman conducted a study about the effect of optimism and locus of control on the quality of life in Parkinson's patients and concluded that a higher degree of optimism was associated with a better quality of life and health. Also, the place of internal control was associated with a lower degree of disability.

In 2010, Kostka and Jachimowicz published a research aimed at describing the relationship between optimism, locus of control and quality of life in elderly subjects, emphasising that a high degree of optimism and a place of internal locus of control were essential attributes for the quality of life.

Paladi (2012) asserts that people with an internal locus of control are optimistically oriented towards the future and tend to be more effective in interpersonal relationships.

Objective and hypotheses

The overall objective of this research is to identify the involvement of the personality type and locus of control in the development of an optimistic life orientation.

- We assume that the locus of control influences the optimistic life orientation.
- We assume that the personality type influences the optimistic life orientation.

Method

This research involved the participation of 125 people aged between 18 and 55 years.

The participants are students at the Faculty of Psychology and Educational Sciences within the Hyperion University.

We have used the following measures:

The Rotter Internal-External Control Scale (Rotter, 1966), which aims to determine the internal or external locus of control. The test comprises 29 items. The score can range from 0 to 23 points. A score of less than 8 points indicates an internal locus of control, and a score of more than 8 points indicates an external locus of control.

The Myers-Briggs Type Indicator (MBTI) (Myers, 1962) – in this study, the standard form of MBTI was used, the G-form comprising 126 items to measure the subject's preference for a certain dimension: introversion and extraversion (IE), sensory and intuitive (SI), thinking and feeling (TF), perception and judgment (PJ). Scoring is based on four tables, one for each dimension, indicating the score for each response.

The Life Orientation Test – Revised (LOT-R) contains 10 items that measure optimism and pessimism. The responses to items are based on a response scale, where A = high agreement, B = little agreement, C = no agreement or disagreement, D = little disagreement, E = strong disagreement. Based on the item responses, a score of 0 to 5 is given, where A = 5.

Results

Results have shown that locus of control, extraversion vs. introversion dimension and sensitivity vs. intuition dimension have implications on an optimistic life orientation. Therefore, an internal locus of control is associated with a high level of optimism, and extraversion and intuition dimensions are also associated with an optimistic life orientation.

Application of the Rotter Internal-External Control Scale showed that 35.2% of the study participants had an internal locus of control, while 64.8% had an external locus of control (Table 1).

Table 1. *Rotter Test frequencies*

	Internal	External
Locus of control	35.2	64.8

The MBTI test results showed that 41.6% of participants were extraverts, and 58.4% were introverts. In terms of sensitivity vs. intuition dimension, 68.8% of participants belong to the sensitivity type, while 31.2% are intuitive. 39.2% of participants belong to the feeling type, and 60.8%, to the thinking type. The last dimension, perception vs. judgment, showed that 53.6% of participants belong to the perception type, while 46.4%, to the judgment type (Table 2).

Table 2. *MBTI Test frequencies*

Extraversion vs. Introversion	Sensitivity vs. Intuition	Thinking vs. Feeling	Perception vs. Judgment
Extraversion: 41.6	Sensitivity: 68.8	Feeling: 39.2	Perception: 53.6
Introversion: 58.4	Intuition: 31.2	Thinking: 60.8	Judgment: 46.4

The LOT-R test results showed that 80% of participants had an optimistic life orientation, and 20% had a pessimistic life orientation (Table 3).

Table 3. *LOT-R Test frequencies*

	Optimism	Pessimism
Life orientation	80%	20%

Concerning participants with an optimistic life orientation, 64% have an internal locus of control, while 36% have an external locus of control; 51% are introverted, and 49% are extraverted; 64% belong to the sensitivity type, while 36% are intuitive; 58% belong to the thinking type, and 42%, to the feeling type; 50% belong to the perception type, and 50%, to the judgment type (Table 4).

Table 4. Crosstabs: Percentages resulting from the association between Rotter Test and MBTI with LOT-R

	Locus of control		Extraversion vs. Introversion		Sensitivity vs. Intuition		Thinking vs. Feeling		Perception vs. Judgment	
	Internal	External	E	I	S	I	T	F	P	J
Optimism	64	36	51	49	64	36	42	58	50	50

We used the *t* test for two independent samples to validate the hypotheses (we mention that the results of Levene's test are insignificant, $p > 0.05$).

The results of *t* test show that differences in levels of optimism between individuals with internal and external locus of control are statistically significant for $p = 0.038 < 0.05$. This result confirms the hypothesis assuming that the locus of control influences the optimistic life orientation.

Also, differences between extraverted and introverted individuals, but also intuitive- and sensory-type individuals are statistically significant for $p = 0.001 < 0.05$ and $p = 0.041 < 0.05$. This result confirms the hypothesis assuming that the personality type influences the optimistic life orientation (Table 5).

Table 5. Values of *p* according to the *t* test for two independent samples

	Locus of control	Extraversion vs. Introversion	Sensitivity vs. Intuition	Thinking vs. Feeling	Perception vs. Judgment
Optimism	.038	.001	.041	.398	.289

Conclusions

According to the obtained results, an internal locus of control and extraversion and intuition dimensions are associated with a high level of optimism.

The results of this research are consistent with other research in the field, where optimism has been shown to be associated primarily with extraversion (Marshall et al., 1992; Sharpe, Martin, & Roth, 2011).

It has also been found that optimism is correlated positively with the internal locus of control (Guarnera & Williams, 1987).

We consider that the contribution of this research is important in terms of a better understanding of how a person views his or her own life.

Determining the factors involved in the construction of an optimistic life orientation is essential in shaping a better image of human behaviour.

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WAYS OF DEVELOPING STRENGTH IN ATHLETICS – THEORETICAL APPROACHES

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Abstract. A world-class athlete is above all a harmonious combination of motor qualities: they are fit for prolonged effort, perform the motor act with accuracy using minimum muscle energy and can express the highest possible strength with maximum execution speed, namely they possess resistance, coordination and power. Various studies focusing on strength have highlighted the particular value of this quality in achieving sports performance even among endurance runners. This paper discusses the importance of choosing the most suitable methods in order to improve the maximum strength of a muscle or muscle group. Three of the many methods by which an athlete who practices the sprinting-jumping-throwing events (but not only) can reach the highest level of strength are: the maximum load method; the heavy-load method repeated by a maximum number of times; the heavy-load method performed at maximum speed. These variants must be used and continuously alternated in annual programming, except for the training stages preceding competitions, when the most specific exercises will be used almost exclusively.

Keywords: maximum strength, athletic events, methods.

Introduction

The entire literature that addresses strength as a motor quality is built around the statements made by the famous Zatsiorsky, recognised as the one who laid the basis for its development. Over time, many authors have struggled to bring something new, if not related to methods, then at least to complementing its definition.

Searching for the perfect “recipe”, each coach is confronted with many questions: When and how should the strength training with additional loads be introduced? How should movements be performed so that they act in turn on the agonists and antagonists? How should complex movements be addressed? But especially, how heavy should the load be?

In our paper, we shall try to answer some of these questions from the perspective of athletics.

Topic addressed

The maximum load method

The maximum load method positively influences the workouts due to the increase in diameter of the muscle fibers. It may cause gains in maximum strength, which are up to three times higher than those obtained through muscle hypertrophy. Within this method, the resistance or load must always be close to the athlete’s maximum potential.

The athlete’s records for different weightlifting techniques will be considered and lower loads (values) (90-95%), with a maximum number of 3 repeats, will be proposed (Bompa, 2010, p. 289).

Very often used, the method is recommended for athletes whose growth has stopped, but whose muscles work at a reasonable level.

Exercise intensity: between 90 and 95% of the athlete’s maximal concentric strength, with a maximum of 3 to 5 repeats per series.

Exercise duration: between 2 and 7 seconds, corresponding to the development of alactic anaerobic power.

Break duration: 2 to 3 minutes between series.

Type of break: active, because the high level of neuromuscular excitation must be maintained. Between series, it is appropriate to use walking, mild running or even better simple games to train reflexes, which have the advantage of stimulating the nervous system without additional energy costs.

Workload: it depends on the level of the athlete. The number of series is generally limited to no more than 7 for each of the three recommended procedures (Pradet, 2005, p. 122).

Variety will be sought when choosing the procedures: exercises that use the same muscle groups, different muscle groups or alternate local demands (back-lying thrust) with global exercises (snatch or neck-thrust squats).

Advantages. The high efficiency of this method derives from the quality of the resulting neuromuscular excitation and the use of motor units, primarily the fast-twitch fibers.

Disadvantages. Gestural execution is approximate, because the extreme exercise intensity does not positively influence the coordination between different muscle groups. At the same time, the exclusive use of the method

very quickly leads to stagnation in performance. These inconveniences can be limited by combining the method with the other ones and/or by a greater variety in the exercise parameters:

- basic movement performed from/with different positions (classical back-lying thrust, side-lying thrust, leg thrust), but also various grips (hands close together or increasingly apart);
- various ranges of motion (full squats, half-squats, quarter-squats);
- alternating different types of muscle contractions during the same movement (concentric-isometric-eccentric contractions);
- varying the intensity by alternating different loads (90% x 3, 100% x 1, return to accessible weights);
- varying the length of breaks.

The use of this method is recommended for the final stages of training, when its status changes from auxiliary physical training to specific physical training. A considerable gain in maximum strength is achieved with two sessions per week, at a 3-day distance one session to another (Del Moral, 2015, p. 251).

Example of lesson for maximum strength development with maximum loads:

- warm-up (12' running, followed by the work of muscle groups that are to be used);
- snatch: 1x10x empty bar: 2x3x 90%; 1x2x 95%; 1x1x 100%; 1x2x 95%; 1x3 x 90% with a 2' break between series;
- oblique press squats: 1x10x 50% (B: 3'); 3x3x 90% (B: 1:30' between series); 3x3x 110% (B: 1:30' between series), slow lowering of the weight and uninterrupted execution (depending on the configuration of the machine, extra help might be needed to reposition the load);
- back-lying thrust: 1x10x 50% (B: 3'); 3x3x 90% (B: 1:30' between series, then B: 3'); 3x3x 95% (B: 1:30' between series, then B: 3'); 1x3x 100%. If the concentric mode is difficult to perform in the last series, external support is used (Broussal & Bolliet, 2012, p. 310).

The heavy-load method repeated by a maximum number of times

The efficiency of this method is based on factors that complement the previously described one, but its frequent use generally leads to an increase in muscle volume (unnecessary, even unsuitable in certain athletic events), and its exclusive use causes some drawbacks. Thus, the accumulated fatigue has a negative impact on the quality of neuromuscular transmission, and the work to exhaustion is expensive in terms of energy and very quickly leads to stagnation in performance by inducing overtraining states.

The method must be complementary to the others and associated with workouts for the development of energy systems (anaerobic/aerobic power and capacity). Its use is recommended in the periods of general physical training and, in contrast to the maximum load method, its importance diminishes as the competition gets closer (Basco, Cotell, & Mognoni, 1995).

Exercise intensity: between 60 and 75% of the athlete's maximal concentric strength for the concerned method. The benchmark is the load with which the athlete can to perform 10 reps.

Exercise duration: between 10 and 30".

Break duration: between 1'30 (between series) and 3-5' (between sets).

Type of break: active (walking, stretching).

Workload: the minimum number of series for each exercise is 6, and 10 for the high level. Only 3 exercises per session are recommended, and they should engage different areas of the body.

Disadvantages. The fatigue caused by the accumulation of repeats may lead to a decrease in muscle contraction speed. This negative effect can be countered by introducing a maximal intensity lesson, for which sufficient recovery (2 days) should be provided.

The content of the lesson is organized based on the principle of variation in exercise parameters:

- the speed of exercise execution - in order to complete the last repeats with a fresh reserve, the first exercises are performed slowly;
- the type of muscle contractions - during the last repeats and with high-intensity loads, there is a transition from concentric to eccentric contractions. In the case of moderate loads, the reverse strategy is applied.

Example of lesson for maximum strength development with heavy loads, repeated by a maximum number of times (workshops are used):

- warm-up (12' running, followed by 3x100m regular running, empty bar exercises);
- pull-ups - 5x10 (B: 1'30) B: 3 min;
- neck-thrust squats (65%) - 5x10 (B: 1'30) B: 3 min;
- pull-ups - 5x10 (B: 1'30) B: 5 min;

- pull-downs from lying prone on the bench (65%) - 5x10 (B: 1'30) B: 3 min;
- neck-thrust squats (65%) - 5x10 (B: 1'30) B: 3 min;
- pull-downs from lying prone on the bench (65%) - 5x10 (B: 1'30) (Pradet, 2005, p. 135).

The heavy-load method performed at maximum speed

This method aims at the high-quality effort, seeking the achievement of maximum power. It positively influences intermuscular coordination, allows the rapid transfer of gains recorded in real situations and becomes increasingly important as the competition gets closer (in the precompetitive period). In the specific period, concentric and plyometric contractions for maximum strength development will be used almost exclusively, because they allow the highest possible execution speed. This is about power exercises, where motor coordination and gestural technique are maximally close to the athlete's specialty (Christophe, 2016).

Exercise intensity: between 50 and 70% of the athlete's maximum potential, in relation to the type of muscle contraction.

Exercise duration: it always remains in the alactacid zone, respectively maximum 6 to 7 seconds for a number of 6 reps in each series (one repeat = one second). If the movement speed begins to decrease, the load is reduced.

Break duration: it is the one characteristic to the alactacid process. Between series, the break must be long enough (2 to 3 minutes) to allow restoration of energy stores used, but also short enough to maintain the level of neuromuscular excitation produced in the body by the high effort. Between the groups of exercises, the rest can be 5 to 6 minutes.

Type of break: active (slow running, quick-reaction exercises), due to the need for maintaining neuromuscular excitation, but inexpensive in terms of energy.

Workload: the number of series for an exercise is 5-6 and no more than 4 exercises (procedures) will be practiced within one lesson. The difficulty of this method consists in finding the balance between the quality and quantity of the effort provided during the lesson, without decreasing the execution speed. For this, each series is timed and, if a decrease in performance is noted, the athlete will be asked for another last series, after increasing the rest period.

Advantages. It is a quickly efficient method that does not need special training cycles: two weekly sessions scheduled during a stage (or two at the most) are sufficient.

Disadvantages. This type of workouts should be practiced by a rested body, possibly at the beginning of the session or after a day off. In a microcycle, they will be separated by at least 3 days (Reiss, Prevost, & Cazorla, 2017).

Example of lesson for maximum strength development with heavy loads, performed at maximum speed:

- warm-up (12' running, stretching, 3-4x 50-60m accelerated running, 3-4x 5-6 push-ups);
- back-lying thrust: 1x10x 30% (B: 3'); 2x6x 60% (B: 2' between series); 2x6x 70% (B: 3' between series); 1x6x 80%. All repeats are performed at maximum speed;
- snatch to lunge: 1x10x 30% (B: 2'); 5x6x 60% (B: 3 between series). Being a high-technicality exercise, too much resistance should be avoided;
- pull-downs from lying prone obliquely on the bench: 1x10x 30% (B: 2'); 2x6x 50% (B: 2'); 2x6x 70% (B: 2'); 2x6x 50% (B: 2');
- cooling down: 10' mild running, followed by passive stretching.

Conclusions

In athletics, maximum strength is important because, along with speed, determines the "power" quality. For explosive events, it is vital that the muscle power reaches the highest level, without using strength or/and speed at extreme standards. To this end, priority is given to strength-speed exercises.

This paper presents three of the many methods by which an athlete who practices the sprinting-jumping-throwing events (but not only) can reach the highest level of strength. These variants must be used and continuously alternated in annual programming, except for the training stages preceding competitions, when the most specific exercises will be used almost exclusively.

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EVOLUTION OF THE LEVEL OF INTELLIGENCE IN THE SPORTS TRAINING PRACTICE IN 6-YEAR-OLD CHILDREN

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Abstract. *This study, which tracked the evolution of the intelligence level, was carried out on a number of 40 subjects represented by children aged 6, divided into two groups: experimental group I (children from a school in Abu Dhabi) and experimental group II (children from a school in Onești). In order to know the evolution of their level of intelligence, we used the following research methods: bibliographic study, pedagogical observation, experiment, testing, statistical and mathematical method, graphical method, data analysis and interpretation. The subject evaluation was initial and final, after 6 months, during which the children were initiated into handball through the Coloured Progressive Matrices (CPM) Test. The findings of the study highlight that the level of intelligence differs from one child to another, but also the idea that handball training organized on the basis of a training program, for a period of 6 months, leads to the improvement of intelligence in 6-year-old children. These findings underline that, in the process of initiation into handball, one has to take into account the individual peculiarities and possibilities of the children's evolution.*

Keywords: *evolution, intelligence, training, children.*

Introduction

Forming the ability to practice a sport implies the integration of the subjects into a training activity that complies with the rigours of learning, which are subordinated to the laws of development. Handball initiation involves an organized work, which requires the child's thinking and concentration, cognitive-operational psychological processes that contribute most to the formation and evolution of human behaviour, "intelligence and creative imagination being the most important, as they contribute to the integration of other cognitive factors" (Stoica, 1996, p. 87) in learning the activity. In the DEX (2012, p. 497), the concept of "intelligence" is presented as "the ability to understand easily and well, to grasp what is essential, to solve new situations or problems based on the previously accumulated experience". The intelligence of movement, i.e. motor intelligence, manifests in activities which require solving motor situations by performing unique movements or adapting automated movements to the momentary conditions. "Motor solutions often have an ineffable character, but they are always characterised by speed, promptitude, coordination, efficiency and even distinction" (Popescu-Neveanu, 1978, pp. 369-370). Intelligence requires stimulated experience in the process of habituation of the child with a certain way of responding, acting, which is achieved over a long period of time. Nowadays, "what is essential is not learning to know, but learning how to act" (Schwartz, 1976, p. 120), a concept that ensures the individual's independence of action. Seidler, Noll and Theirs (2004, p. 1775) consider intelligence as "the ability to process information by understanding all the sensations a human perceives". Intelligence has a dual meaning: on the one hand, it is considered as a process of assimilation and interpretation of various information for the necessary adaptations, and on the other hand, it is a skill which resides in the operational structures represented by certain qualities (complexity, flexibility, fluidity, productivity) through which behavioural efficiency is ensured. Considered by Colibaba and Bota (1998, p. 137) as "a special skill which includes in its structure cognitive (sensory, logical) elements and, besides the motor memory, also some motor skills", motor or kinaesthetic intelligence ensures the efficiency of the activity carried out in a simple and complex way, and practice has demonstrated that "minimal intelligence is necessary for any activity" (Epuran & Holdevici, 1980, p. 44), regardless of age. The handball training with specific elements and techniques, in suitable sports facilities and with appropriate equipment, based on teaching methods and strategies that have to take into account "the child's own nature, the laws of the psychological constitution, the laws of development" (Piaget, 1972, p. 121), depend on the mastery of the teacher's competences. The training, the preparation of children for a sports discipline particularly requires "the organization of working conditions in which students will learn", but also the continuous stimulation of their participation.

Material and methods

The purpose of this study is to highlight the possibility of improving the intelligence level following the practice of organized physical exercises.

Through this research, we aim to verify the following *hypothesis*: handball training based on an initiation programme leads to the improvement of intelligence in 6-year-old children.

This experimental research involved 40 children divided into 2 groups. The children were chosen randomly. The experimental group I, which was ethnically heterogeneous, consisted of four 1st grade classrooms of children (10 boys and 10 girls) from a school in Abu Dhabi. The children in the experimental group II (10 girls and 10 boys) were randomly chosen among four preparatory classes from a school in Onești and represented an ethnically homogenous (Romanian) group. The children in both groups had their parents' consent to participate in the training.

The research was conducted between September 2016 and March 2017 in the two aforementioned schools, under the guidance of two specialist teachers. As research methods, we used: bibliographic study, pedagogical observation, experiment, testing, statistical and mathematical method, graphical method, analysis and interpretation of the results. Both groups completed the Coloured Progressive Matrices Test. This is a non-verbal test that examines the intellectual level, the clarity of the observation ability and the quality of student's thinking. The test is composed of vividly coloured pictures presented in the form of an individual notebook. It comprises 36 figures grouped in three series of 12 matrices: series A, AB and B. The test is made up so that the student progresses, from an intellectual point of view, from simple tasks to complex tasks. Each student receives a brochure with Raven boards and explanations regarding the pictures on the paper and how they should choose the correct picture out of the 6 displayed below. The examiner must make sure that the example and explanations are sufficiently accurate so that the 6-year-old child understands the test tasks. Children will receive an answer sheet, where each question has 6 boxes with numbers from 1 to 6, representing the pictures at the bottom of each Raven board. Children should cut the correct answer with an oblique line. If they do not know the answer, they are asked not to fill in anything. The test will start from top to bottom along each column, in the order of A to B. No extra help is provided to children and the subject's choices are not commented. For each correct answer, 1 point is awarded. The total score is obtained by summing all the points made by the subject, according to the following grading scale (Table 1) (Zaharnic et al., 1974).

Table 1. *Correct responses to the CPM Test*

Item	1	2	3	4	5	6	7	8	9	10	11	12
A	4	5	1	2	6	3	6	2	1	3	4	5
AB	4	5	1	6	2	1	3	4	6	3	5	2
B	2	6	1	2	1	3	5	6	4	3	4	5

Interpretation of results: quantitative interpretation consists of reporting the individual performance to the standard values found in Table 2.

Table 2. *Number of centiles corresponding to the number of points accumulated* (according Zaharnic et al., 1974)

Centiles	Scores according to age groups				
	6 years	7 years	8 years	9 years	10 years
10	11	12	14	15	16
20	12	13	15	16	17
30	13	14	16	17	20
40	14	15	17	19	22
50	15	16	18	21	24
60	16	17	20	22	25
70	17	19	22	23	26
80	18	21	24	24	28
90	20	24	26	27	29
100	23	26	28	28	33

The number of centiles thus obtained allowed the identification of the degree of intelligence, according to the data presented in Table 3.

Table 3. Results and their value in centiles and qualifications (according to Zaharnic et al., 1974)

Intellectual level	Superior intelligence	High average intelligence	Average intelligence	Low average intelligence	Mental deficiency
Centiles	> 95	75-90	25-75	10-25	10 <

The process of initiation into the handball game of the both experimental groups followed a long-term planning between September 2016 and March 2017. The established goals were fulfilled through the training that took place 3 times a week, with duration of 80 minutes.

For both research groups, we used exercises aimed at learning basic technical elements, movement games, relays, applicative routes, but also at improving the students' behaviour. In order to improve non-verbal intelligence, in each training lesson, the children had to choose a way of execution for two of the exercises. These two exercises were explained by two variants of practice (i.e.: Example no. 1 – from the sagittal standing position, with his/her feet spread and the ball in hand, the child can crawl under a 30-cm hurdle placed 2-m away from the starting line or can pass over it. Example no. 2 – from the sagittal position, with his/her feet spread, 10-m running to the pole, passing by the pole and return to the end of the queue. The child chooses either to roll the ball on the ground with one hand or to roll the ball on the ground with two hands on either the right-hand throw or the left-hand throw).

Results

The results obtained by applying the Coloured Progressive Matrices Test for the two groups involved in the experiment are presented in the form of assessment indicators (Table 4).

Table 4. Initial and final results of the CPM Test for the two experimental groups

Assessment items	Experimental group I			Experimental group II		
	I	F	Diff.	I	F	Diff.
Arithmetic mean	21.70	23.20	1.50	23.20	23.50	0.30
Min. value	11	13	2	11	12	1
Max. value	29	30	1	31	31	0
Range	18	17	-1	20	19	-1
Standard deviation	5.16	4.98	-0.18	5.23	5.07	-0.16
Coefficient of variation %	24.76	22.26	-2.5	22.57	21.63	-0.94
Total Student	0.57	0.55	-0.02	0.58	0.56	-0.02

*Legend: I = initial, F = final, Diff = difference between final and initial testing

Results on the intelligence levels and the number of points are found in Table 5.

Table 5. Distribution of subjects by intelligence levels and number of points

Intellectual level and number of points	Experimental group I		Experimental group II	
	Initial	Final	Initial	Final
Low average intelligence (10-25 centiles)	1	0	1	0
Average intelligence (25-75 centiles)	4	3	2	3
High average intelligence (75-90 centiles)	4	5	3	3
Superior intelligence (>95)	11	12	14	14
Total subjects	20	20	20	20

In order to verify if there are significant differences for both experimental groups, we applied the paired *t* test.

Table 6. Results of the *t*-dependent test (I-F) in the initial and final PCM testing for the experimental group I and experimental group II

Assessment items		Experimental group I		Experimental group II	
		IT	FT	IT	FT
T-dependent test (I-F)	calculated <i>t</i>		-3.577		-0.960
	<i>p</i>		0.002		0.349

Legend: IT = initial testing, FT = final testing

The results of the arithmetic mean for the experimental groups increased significantly between the two tests: from a total average score of 21.7 points at the initial testing to 23.2 points at the final testing for the experimental group I. The results of the arithmetic mean for the experimental group II had a positive evolution between the two tests (from 23.2 initially to 23.5 finally), but they were statistically insignificant (the value of p , by applying the Student t -dependent test, was higher than 0.05) (Table 6).

Discussions and conclusions

Although, in the initial assessment, the results of the experimental group II were better, the experimental group I obtained an arithmetic mean higher by 1.5 points in the final evaluation. By comparing the results of the arithmetic means in the two groups, it is easy to see that the experimental group II has recorded a progress of 0.30 points for the arithmetic mean, and the experimental group I, a progress of 1.50 points (see Tables 4 and 5).

In any case, the results progressed in both groups. The research subjects got a higher score after the second testing, the interpretation of the number of centiles placing some children in other categories of the intelligence level compared to the initial testing (see Table 5).

After applying the Coloured Progressive Matrices Test to the experimental group I, we have obtained (according to Table 4) the following results:

- the arithmetic mean has a value of 21.70 points in the initial evaluation and 23.20 points in the final one, exceeding 95 centiles, meaning that the intelligence level of the group is generally high and even improved;
- the maximum score of 29 points was obtained in the first testing, i.e. over 100 centiles revealing superior intelligence, and 30 points in the second testing;
- in the initial assessment, only one child recorded a minimum score of 11 points, meaning 10 centiles, therefore a low average intelligence; however, its value increased by 2 points after the second testing, and the child has passed in the category of those with an average intelligence level;
- in the initial testing, 4 children recorded values of 12-17 points, and in the second testing, 3 children. They got between 25-75 centiles, meaning an average intelligence level equivalent to 14-20 points;
- in the initial testing, 4 children had values between 18-20 points, and in the final testing, 5, meaning a high average intelligence level, with values between 75-90 centiles;
- in the initial testing, out of the total number of children, 11 children in the first testing and 12 children in the final testing recorded over 21 points, therefore over 95 centiles. In the two tests, these children fall into the category with a high intelligence level;
- the initial amplitude is 18 points, and the final one is of 17 points, the difference between the two extremes being quite high in both cases;
- the initial arithmetic mean has a value of 21.7 points, thus resulting that the intelligence level of the group is above average, and the final arithmetic mean has a value of 23.2 points, exceeding the value of 95 centiles, which indicates a generally high intelligence level of the group;
- the initial standard deviation is 5.16, and the final one is 4.98, representing the mean value of the points with which children deviate from the arithmetic mean;
- the coefficient of variation, of 24.76% initially and 22.26% finally, indicates an average degree of homogeneity of the group, with a slight increase resulting from the final testing.

As a result of applying the Colour Progressive Matrices Test to the 2nd experimental group and interpreting the significance indices, we infer the following (see Tables 4 and 5):

- the arithmetic mean has a high value of 23.20 points, namely over 100 centiles, thus a high intelligence level in the first testing and 23.50 in the final testing;
- the minimum value obtained in the CPM Test is still 11, like in the experimental group I, only one child having a low intelligence level, the same child recording 12 points in the second testing;
- in the initial assessment, only one child obtained the minimum value of 11 points, meaning 10 centiles, and therefore a low average intelligence level; this value has increased by 1 point in the second testing, and thus the child goes into the category of those with an average intelligence level;
- in the first testing, 2 children recorded between 12-17 points, and in the second testing, 3 children had this value, recording between 25-75 centiles, meaning an average level of intelligence;
- in the first testing, 3 children recorded 18-20 points, and in the final one, also 3. They were at an above average intelligence level, with values between 75-90 centiles;

- in the first testing, out of the total number of children, 14 children scored over 21 points, i.e. over 95 centiles, in the initial and final assessments. In the two tests, they fell into the category of children with a high intelligence level;
- the initial amplitude is 20 points, and the final one is 19 points, the difference between the two extremes being quite high for both cases;
- the initial standard deviation is not very high, 5.23 points, representing the value of points with which children deviate from the arithmetic mean and 5.07 points the final standard deviation;
- the initial coefficient of variation, 22.57%, and the final one, 21.63%, indicate a homogeneous group (20 subjects are involved).

After comparing the results obtained (see Table 4) following the Progressive Coloured Matrices Test, close approximate values are recorded after both tests regarding the level of intelligence for the two groups, although the values are slightly higher in favour of the experimental group II. Both have recorded better results after the second testing and, although the experimental group II, still has an advantage of 0.30 points, by comparing the final arithmetic mean, the progress of the experimental group I is higher by 1.20 points than that of the experimental group II. It has been found, through these advances, that “through work, we can achieve the goal pursued” (Marcu & Dan, 2010, p. 69), a goal that depends on the particularities of each individual’s development.

Starting from the statement of two great specialists, Colibaba and Bota (1998, p. 137), that motor or kinaesthetic intelligence is a “special skill that involves in its structure cognitive (sensory, logical) elements, besides the motor memory, also the accumulated motor skills”, and from the fact that it is an encompassing skill which ensures the efficiency of the activity carried out in a simple and complex way, we consider that the practical training performed with the two groups has demonstrated that “minimal intelligence is necessary for any activity” (Epuran & Holdevici, 1980, p. 44), regardless of age. Intelligence is a complex psycho-physiological process that influences the learning process and implicitly the behaviour evolution, and the present research has succeeded in highlighting the real possibilities of improving the child’s level of intelligence in the instructional-educational process based on handball sports activities for 6-year-old children, regardless of the geographical area.

In conclusion, the research highlights that:

- the hypothesis according to which handball training based on an initiation programme leads to the improvement of intelligence in 6-year-old children has been confirmed.

The condition of human development must be sought in humans, in the predispositions with which they are invested at the time of birth, but also in the evolution of the processes which guide the development of each individual, “by the psychological changes taking place from birth to the end of life” (Neacșu, 2010, p. 71), during the training process.

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ATTITUDE-MOTOR BEHAVIOUR CONVERGENCE

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Abstract. *The 21st century society goes through outstanding changes in many aspects of life, from population dynamics to the further development of communication technology. Many socio-human analysts believe that the profound changes at the macro-social scale (technical-economic development, intensive urbanisation, improvement and massification of the media, democratisation and pluralism, diversification of lifestyles) mark radically not only attitudes and more particular behaviours of the people, but also intimate mechanisms of self-formation and structuring. Research has shown that strong attitudes exert a greater influence on behaviour. It has also been noted that people with strong opinions and beliefs have high availability to act in accordance with their attitudes. In Physical Education and Sports, knowing the attitudes of an individual offers the possibility of predicting his or her motor behaviour. The purpose of this study is to describe the conceptual framework of knowing the attitudes and motor behaviour through psychosocial theories and models, and how to transfer them to Physical Education and Sports (PES).*

Keywords: *attitude, motor behaviour, psychosocial theories.*

Introduction

Attitudes are acquired during life by single or multiple experiences, and also direct or indirect ones. In other words, attitudes are formed through a process of social learning. However, some studies have shown that, in forming attitudes, genetic factors also intervene (Iluț, 2009, p. 443).

It is difficult to assume that a direct hereditary determinism operates in punctual attitudes towards social objects. However, the genetic basis can indirectly influence many of the individual's attitudes. For example, the general (hereditary) mood of optimism colours a whole range of assessments of the social in which we live, including a great work satisfaction, regardless of its nature, versus pessimism. Also, a more pronounced innate curiosity entails a different kind of experiences and hence, another attitudinal spectrum.

The first rigorous definition of the concept of "attitude" was proposed by Allport (1935, p. 810): "An attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related". This definition suggests that the attitude has several elements:

- it is a personal experience with a neurobiological substrate and can only be measured in an indirect manner through its behavioural and psychophysiological manifestations;
- attitudes are a set of cognitive elements relative to an object to which positive and negative assessments (affects) are associated;
- the central element is that attitudes are the precursors of behaviour;
- the individual produces tailored and consistent reactions towards the objects associated to the attitude.

Popescu-Neveanu (1978, p. 47) sees attitude as a "relatively constant way of relating the individual or the group to certain facets of the social life and to oneself".

Chelcea (2003, p. 44) defines attitude as "the position of a person or group of acceptance or rejection, with a higher or lower intensity, of the objects, phenomena, persons, groups or institutions".

By practicing motor activities, we communicate a full range of human feelings, the manifestation of the self and we positively influence the behaviour by consciously becoming responsible of all factors involved in this activity. PES professionals manifest preference for the concept of "motor behaviour" to the disfavour of that of "conduct".

The definition in DEX (2009) is the following: "Way of acting in certain surroundings or situations; conduct". Popescu-Neveanu (1978, p. 123) defines behaviour as "the set of objectively observable adaptive reactions that a body provided with a nervous system executes in response to environmental stimuli".

Motor behaviour develops gradually and is closely related to neuromotor maturation and educational training (Epuran & Horghidan, 1994, p. 114). Horghidan (2000, pp. 89-90), starting from the psyche-motor relationship, considers that the motor background accumulated in the appropriate dimension of motor behaviour is the principle of development for different types of behaviours.

Discussions

The high parallelism between the attitudinal and behavioural responses is first due to the fact that attitude is a motivational force, generating a specific action. As such, it also seems a cause of the behaviour, multiplying in the conduct acts of the human being. By socialising, the individual not only acquires certain attitudes and beliefs, but they are also inoculated the principle that these have to be respected, the norm promoted being that of practising an agreement between the creed, word and deed. On such a property we base the idea that, if we change people's mentality, their behaviour will also change, an idea which is invoked so much in the current context in Romania.

Another explanation for the convergence between attitude and behaviour is to self-justify (rationalise) the individual's actions, according to the theory of cognitive dissonance. In this case, the behaviour is the cause and the attitude is the effect. We can give the example of individuals who, more or less forced by circumstances, take discrepant action against their prior convictions, and once taken, those acts of conduct cause a reformulation of the beliefs (attitudes), an adaptation to the new situation.

Bem (1972) explains the attitude-behaviour concordance by the fact that attitudes are the result of self-perception (the perception of one's own behaviour). As we can usually deduce the attitudes of other people from what they do, so it happens in the case of our own attitudes: we define ourselves and self-attribute an attitude from appreciating the way in which we have behaved.

The values defined as foundations of the attitudinal construction, a symbiosis of psychological and axiological elements (cognitive, affective, spiritual, volitional ones) expressed behaviourally – the beliefs and norms – were used to develop the integrative theoretical model proposed by Stern et al. (1999).

This model explains the pro-environmental behaviour by combining the theory based on values with the theory of norm activation and the NEP (New Environmental Paradigm) perspective and it is composed of four variables: values (corresponding to the axiological orientations of being selfish, altruistic and bio-spherical), beliefs (the NEP ecological vision, consequences of the evaluation and perceived ability to reduce negative effects), personal norms and pro-environmental behaviours.

Using the analogue reasoning, we propose a model to explain the pro-motion behaviour, based on the theory of values-beliefs-norms (Figure 1).

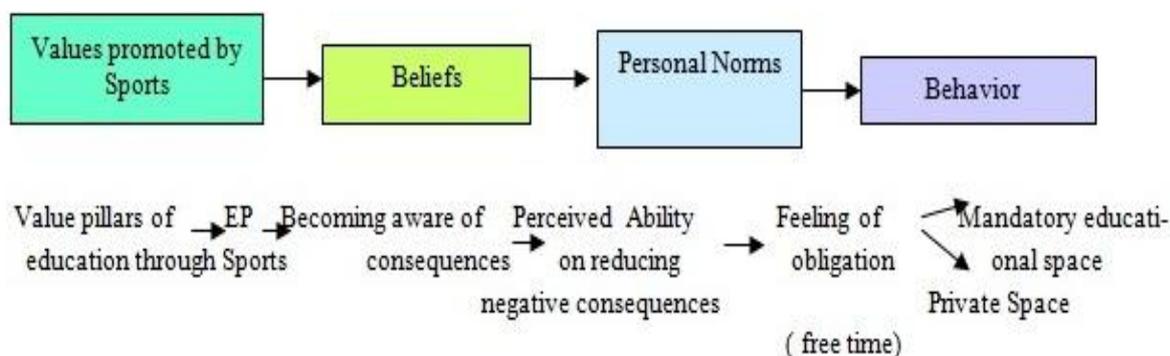


Figure 1. Model for the theory of values-beliefs-norms

In the graphical representation above, we present the four major components (variables) of the analogue model, namely:

The *values* promoted through the sports practiced both during the mandatory classes and the spare time. These values, which have become objectives and curricular elements, can be formulated in scientific terms, with formative potential. The value pillars of the character education through sports can be included in an inventory list built from the experiences in physical education and sports, from the speciality literature and the recommendations made by specialists (sociologists, psychologists, teachers of physical education and sports, coaches, head teachers). We can illustrate these through the following values which have the status of an educational-cultural model:

- Self-control, help, activism, altruism;
- Willingness, enjoyment;
- Cooperation, control, correctness, self-knowledge, courage;
- Discipline, availability, dignity;
- Balance, enthusiasm, equality with the others;

- Fair-play, determination, initiative, trust;
- Intrinsic positive motivation, honesty, optimism;
- Perseverance, friendship, punctuality;
- Respect, responsibility, resistance (to negative influences);
- Seriousness, critical spirit, mastering oneself, sense of responsibility;
- Tolerance.

Beliefs, designating the most comprehensive cognitive-evaluative unit, constitute the ideaistic infrastructure of the human psyche and the spirituality of mankind. In the model presented, beliefs include the vision of higher forums regarding the educational policies (EP) developed to promote sports activity among youths, consequences of the assessment (the increase in the number of youths who are active in terms of practicing physical exercises) and perceived ability to reduce negative effects.

Personal norms refer to respecting the provisions or rules recognized as mandatory or advisable.

The behaviour becomes desirable with the internalisation of values, beliefs and personal norms by the individual.

In this model, attitudes are not present explicitly, but are considered as implicit. Thus, it is about a position of acceptance or refusal of value orientations and beliefs, the causal relations between the value and cognitive component being mediated by the attitudes towards different values and beliefs.

Among the four components presented, there are direct causal links, meaning that each variable in the network affects the following, and also indirect, which can inter-influence further variables too.

The theory of reasoned action, proposed by the psycho-sociologists Ajzen and Fishbein (1980), is influential and widely accepted. Based on this, a model of behaviour prediction from attitudes has been developed, in which the central element is the “behavioural intention” (Chelcea, 2010, p. 309).

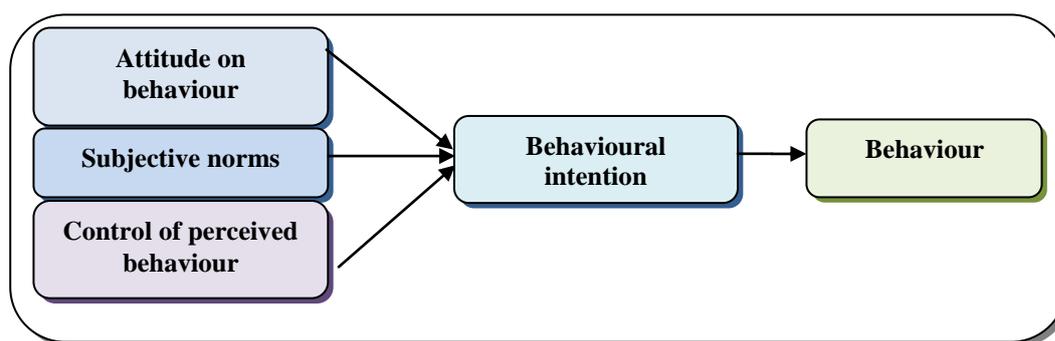


Figure 2. The Model of reasoned action” (Chelcea, 2010)

The Theory of reasoned action (Figure 2) is built on the assumption that people are rational and that information and attitudes guide their behaviour. The behavioural intention is generated by the attitude towards the reasoned behaviour (if I vote for party X, then I retract from the belief I had in my youth), in conjunction with the subjective norms internalised during socialisation (if my former colleagues will see my name on the supporters’ list of the presidential candidate X, they will say I am an opportunist).

Ajzen and Fishbein (1980) believe that the attitude towards the reasoned behaviour has two sources: behavioural assessment (the benefits it brings) and assessing the probability of obtaining the desired benefits. In turn, the subjective norm is conditioned, on the one hand, by the belief that other persons, especially the significant ones (who we admire and love) expect a certain behaviour from us and, on the other hand, by the compliance motivation, the fact that the individual takes into account what others say about us.

Conclusions

The data and analyses presented above suggest that there is a close relation between attitude and behaviour, but of a probabilistic type: only with a certain probability, we can deduce a certain behaviour from a certain attitude and vice versa. The relation is not a simple correlation, but a causal one, the attitude determining, as a motivational constituent, the behaviour. We note as well that the behaviour also determines the attitudes and beliefs of individuals through the phenomenon of post-action justification. If we consider a longer period of time in the lives of individuals and human communities, the link between attitude and behaviour is of causal circularity.

In the design and implementation of specific behaviours or wider actions, individuals typically take into account their capabilities and the parameters of the situation.

Extensive and in-depth studies show that the translation of attitudes into specific behaviour depends on the position of such attitudes in the general attitudinal system, which, in turn, is somewhat hierarchically subordinate to the general values and important ideological themes.

The moderating factors of the attitude-motor behaviour relation are encompassed in three major classes, namely:

- The fundamental biological needs (which are quasi-identical);
- The system of beliefs (mental schemas, representations, values, attitudes, social judgements etc.) shared, to a large extent, collectively;
- The constraints (and opportunities) of the social environment in which people live.

Each of the three realities has its own structures; they are structurally connected, but have, at the same time, continuous processuality. This processuality manifests, on the one hand, at the intra-individual level, in various interpersonal and intergroup relations, and on the other hand, at the historically determined macro-social level.

Authors' contributions

Both authors contributed equally to this article and should be considered as main authors.

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TAEKWONDO AS A UNIVERSITY SPORT

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Abstract. *In terms of development, the definition of physical education and university sports includes a broad range of activities suitable for young people of any skill level, focusing on maximising their own potential according to their option. At the same time, the leisure or organized motor activity is an integral part of the educational action, the most veritable expression of our continuous training, as an imperative of modern society. The idea of a close connection between the mind and the body, as a fundamental idea of Greek education, has become a cultural and educational ideal of most classical and modern pedagogical schools at different levels. This paper is an essay that aims to present some aspects of the development of Taekwondo in the teaching process in Romania and to highlight the justifying aspects for it to be introduced into the university curriculum. The documentation method, along with the critical analysis of the literature studied in connection with the theme, has led us to the idea that Taekwondo can be a successful option for students in Romanian universities.*

Keywords: sport, Taekwondo, university.

Introduction

In terms of development, the definition of physical education and university sports includes a broad range of activities suitable for young people of any skill level, focusing on maximising their own potential according to their option.

The numerous studies on life and its quality admit the role played by sport in increasing the working capacity, both physically and intellectually, in the sustainable development, diminishing aggression etc. The true image and extension of sport is given by the very social life that puts it together with the major preoccupations, such as those of an educational, economic, ideological, cultural, scientific, defence and public order nature, thus encompassing a global conception in which it plays a role of regulated subsystem and regulator on different planes. At the same time, the leisure or organized motor activity is an integral part of the educational action, the most veritable expression of our continuous training, as an imperative of modern society. Thus, specialists from different fields have intensified their research on the content and characteristics of human bio-motor potential, thus regarding the technical content of some sport branches, particularly Taekwondo (TKD), as far as the present study is concerned, in order for the humans to access an optimum result.

Ever since ancient times, people have been concerned about their own motor performance and have created harmonious and aesthetic ideals, and perhaps no other people like the Greek one has given it so much consistency and value.

The idea of a close connection between the mind and the body, as a fundamental idea of Greek education, has become a cultural and educational ideal of most classical and modern pedagogical schools. Autoplasty is the action of modelling one's own being – especially the body – through specific activities. We must not forget that it is necessary to pursue both physical and spiritual results. It is not possible to delimit the physical part from the spiritual one, and this is why many athletes commit mistakes and abandon the way of the Martial Arts (Păunescu, 2004, p. 5). In terms of practicing bodily activities, the individual shapes his or her bodily being. The autoplasic feature comes from the individual's motivation, the intention to achieve the harmonious development of his or her own body and thereby to acquire a superior image of him/herself as a person.

Motor coordination, seen as the ability to effectively perform one's own movements in accordance with trained motor themes, can also be approached from physiological positions, as the cooperation between the central nervous system and the muscular system in a precise form of movement.

Exclusive use of technical features or specific skills leads to the right competition of qualities. The ratio of such development is, however, much higher when the motor skills are improved on the basis of specific exercises.

The current level reflected in the literature

The reflection of the topic in the national literature is highlighted by the publication of the first TKD course for medical university education, containing general information about this sport, its characteristics, the methodical stages of the specific skill training, the competitive university system, the requirements and the necessary evidence for its promotion, in which the author considers that “the most important thing for TKD practitioners is education” (Păunescu, 2011, p. 9). Another work in this regard is that of Păunescu et al. (2013), which attempts to recreate the

relationship between general intelligence and motor skills in combat sports, most of them TKD practitioners, but not performance athletes, whereby the authors argue that “there is a positive correlation between intellectual and motor abilities, in the sense that the score attributed to general intelligence varies in the same direction with the score attributed to motor intelligence. The study was conducted on 40 students randomly selected from 100 students aged 18-21.

A study on self-evaluation of self-esteem among first-year female medical students aged 18 to 22 years, participants in TKD courses, was conducted by Păunescu et al. (2014), who pointed out that they displayed a sense of self-confidence that depended on self-esteem and appreciation, based on a relative sense of self-development. With regard to the interpersonal domain, the ability to be aware of the needs and feelings of others requires the intervention of educational factors, since medical students in the first academic year do not have the ability to empathise with the patient or those with whom they interact, because emotions are a sign of self-education.

Another study conducted at national level, which has also attracted our attention, belongs to Păunescu (2015) and addresses the involvement of TKD practice in the neuropsychological development of children; the research was carried out within the postdoctoral studies at UNEFS Bucharest.

We can mention that a special concern of TKD specialists in our country is focused on performance sports, the literature having many relevant studies for sports performance within the Romanian Taekwondo Federation WT.

Most international studies on TKD were performed on adults. For example, Toskovic, Blessing and Williford (2002) found that dynamic performance in TKD had an impact on heart rate (88.3-92.2% of maximum heart rate), exceeding the 60% threshold recommended for cardio workouts (Franklin, Whaley, & Howley, 2000). Noor, Pieter and Erie (2008) consider that the physical fitness of the young athlete practicing TKD as a recreational sport does not differ according to gender.

The relationship between experience and physical fitness was investigated by Toskovic, Blessing and Williford (2004), while Heller et al. (1998) demonstrated that athletes with experience in TKD had a low body fat index, as well as higher aerobic endurance and better flexibility than their beginner colleagues. Authors such as Bouhleb et al. (2006) have confirmed that students with more experience in TKD may have low body fat and well-developed aerobic capacity. Markovic, Misigoj-Durakovic and Trninis (2005) have found that aerobic endurance and flexibility in Czech female athletes is better than in males.

The height and weight differences for athletes practicing TKD as a recreational sport are not significantly reflected in motor skills, but for performance athletes, they are significant, accounting for 60-70% of the Olympic performance variation (Pieter, 2004).

The transition of the athlete from beginner to high performance is achieved as a result of long and systematic learning (Păunescu et al., 2014).

In the field of education, Kim (2016) publishes the *Taekwondo Instruction for Public Schools* (Kindle edition), with the help of the World Taekwondo Education Foundation (WTEF) in Wilbraham, which provides material and research on TKD education in public schools and supports the publication of works in support of TKD education. This is one of the guidance books for TKD teachers wishing to teach in public schools in the United States.

Issues addressed

The present paper is an essay study on the dynamics of TKD development and the inclusion of this sport among the optional disciplines at university level. The aim of our study is to reveal some aspects regarding the TKD development within the teaching process in Romania and to highlight the justifying aspects for it to be introduced in the university curriculum.

The *research methods* used were: the study of the literature on the sport in question, the analysis and synthesis of the collected information.

Taekwondo is a Korean martial art officially published with this name on April 11, 1955, following the unification of styles under this common name in many schools, and particularly characterised by high kicks, subsequently becoming Taekwondo WTF, the South Korea's national sport. Thus, after the release of Korea under the Japanese occupation, in 1945, Japanese martial arts taught in schools and universities were replaced by the Taekwondo national sport, thus becoming an integral part of the Korean people's culture and education. Currently, in Korea, where the World Federation's permanent headquarters are located, Taekwondo is taught in schools as a compulsory discipline, with students being able to get the black belt at the end of school. In July 17, 1980, the International Olympic Committee admits the World Taekwondo Federation as an official member, with the 1988 Olympic Games being accepted as a demonstration game until Sydney 2000, where it becomes an official Olympic sport. In 2017, the World Federation reaches 208 member countries and over 6.5 million active athletes, while the

Taekwondo population worldwide is estimated at 57 million athletes. Through competitions, this sport has sought to achieve ideals such as power, accuracy and safety.

Since 1986, TKD has been accepted in the university competitions organized by the International Sports Federation and subsequently by the European University Sports Association. Romania has participated in these international competitions from 2008 until now. The best result (bronze medal) was obtained by Maria Liliana Mircica at the 2013 European Universities Taekwondo Championships held in Moscow, the athlete representing the National University of Physical Education and Sports in Bucharest.

At national level, since 2002, Taekwondo WTF sports classes have been implemented in the vocational education system at “Benjamin Franklin” High School, with the first grades being the 5th and 9th.

Since 2005-2006, TKD has been taught in some universities (Bucharest and Cluj), and since 2009, it has been implemented as a discipline in military institutions. The first national university competition was organized in 2005 by the Romanian Taekwondo Federation WTF, and since the 2009 edition so far, it has been supported and organized by the School and University Sports Federation, in collaboration with the specialised federation.

TKD develops a harmonious, balanced person; the development can be physical (Tae and Kwon), but also mental (Do). For those who choose TKD, perseverance, self-discipline and self-control are the main benefits. Athletes learn a lot about themselves, their abilities and how to combine physical and mental aspects in solving everyday problems. Thus:

- physically, it develops coordination, agility, neuromuscular elasticity, balance, spatial-temporal orientation, aerobic and anaerobic endurance;
- morally, the TKD principles induce politeness, integrity, perseverance, self-control, loyalty and an invincible spirit;
- psychologically, it reduces mental tension and anxiety due to daily stress and competition stress, thus preventing hostility and life frustration in a beneficial manner.

TKD teaches man to always aim for perfection; it is education and expansion of personality, is a personal experience. It provides athletes the opportunity to come in contact with people of different origins, ages, socio-economic backgrounds, ethnicities, races, which is an important experience gained in the multicultural exchange of many nations.

According to Păunescu (2011, p. 10), through its socio-cultural dimensions, TKD, as a university sport, offers a unique opportunity to meet other students, communicate with them, assume different roles, acquire moral attitudes, accept activity-related attitudes, experience emotions that are more difficult to feel in other life areas, accept positive lifestyle elements and adapt to the proposed goal of becoming socially active through the performance of others.

Globally, as a university sport, TKD has shown a stable and almost constant development. Thus, the 2017 Universiada was attended by a number five times higher than the first World University Championships of 1986.

The significance of sports competitions gives rise, in general, to emotional states much more intense than the daily ones. If the training and sports training processes influence the formation of student's personality, the competitions leave deep traces in each participant's personality, forming and transforming its qualities.

Place of the Taekwondo course in the university education curriculum

In the opinion of Păunescu (2011, p. 7), physical education and sports in the academic environment, through their objectives and contents, are always social activities with a biological support, contributing to the improvement of students' attributes. This character, in the field of current discovery, is manifested every day and is one of their defining features. However, we specify that their tasks, at all stages of human and social development, have also been oriented towards the achievement of educational goals. As a result, they cannot be understood as activities fulfilling only biological functions, but as activities fulfilling important social functions.

Although, at certain moments of social evolution, the use of physical exercise and physical education and sports was more limited, it has always been linked to the idea of physical improvement, which is an important component of the individual's health and training to respond adequately to the demands of everyday life.

We can say that physical education and sports in the academic environment are an important part of general education, a means of emancipation with a pedagogical content, aiming at the harmonious physical development, psychological strengthening and an ultimate education of the character traits of individuals.

As an organized instructional-educational process, physical education and sports are a bilateral process in which, under specialised leadership, the learners are systematically subject to influences consistent with the objectives of general education and those specific to each stage, as regards the improvement of physical development and motor skills (Păunescu et al., 2014).

The “Physical education and sports” subject is present in the curricula of specialised faculties and higher education institutions in the form of an optional course, which is recognized as part of the instructional-educational process for the training of future specialists.

The instrumental content of this subject must reflect the orientation towards the efficient learning of the profession, providing the future physicians with the set of motor skills and abilities specific to various specialisations, but especially for the purpose of preventing incorrect postures and correcting the established deficiencies.

Through its content, the TKD course for medical students contributes to the completion and improvement of specialised knowledge about the human body and its reactions to various stimuli in different situations. Through the conveyed theoretical and methodological knowledge, TKD can contribute to enriching the knowledge about one’s own body reactions in extreme cases and correcting them in favourable situations by using specific technical elements, but especially by learning complex exercises and actions.

Practicing TKD in an organized setting develops coordination, skill, agility, neuromuscular elasticity, balance, spatial-temporal orientation and exercise capacity, with positive influences on the vitality and health of the athletes. They learn to train together, to be in touch with the others through TKD. All techniques work the whole body in a balanced and coordinated manner, resulting in a natural position and economic movements at all levels.

The selected means, as well as their sequential succession during the lesson, follow the didactic principles of learning, considering that, for a large part of the students, they represent novelties.

In order to achieve the theoretical, methodical and practical knowledge contained in the program, the forms to be used are as follows:

- theoretical lesson (about 15-20%);
- practical and methodical lesson;
- competition lesson;
- individual study;
- participation, as observers, in various TKD competitions and demonstrations.

The TKD lesson, with duration of 90 minutes, has a structure similar to that of the sports training/sports branch, being determined by its underlying principles: the cyclic character, continuity, the dynamics of effort, the relation between general training and specific training.

The TKD lesson in university education is structured in three parts: training the body for effort (warm-up); the fundamental part, which generally includes the group of static elements, refers to several fixed components: the development of exercise capacity, technical training, tactical training, competitive training, general training, specific training, the development of coordination abilities etc.; on the other hand, the group of dynamic elements refers to the change in the relationships between components, according to the training stage and year, as well as to the relationships between volume and intensity, whose weight changes according to the training goals; the final part. These three parts are also determined by the pedagogical and physiological requirements of the training.

The variety of the methods and means used depends on the teacher’s professionalism and can qualify a lesson as a good one, with a very good motivation from the students.

Conclusions

In favour of TKD, as a university sport, we can mention its beneficial influence on the athletes. TKD builds good character and a nonviolent attitude, teaching politeness, integrity, the respect for others, courage and the self-control of stress. Competitions do not aim at harming the contestant, but they behave rather as a test that evaluates physical and mental strength, as well as the athlete’s self-mastery in opposing situations.

In this respect, TKD is not a destructive sport, but a way of life, of social cohabitation.

Those above mentioned recommend Taekwondo as an option for university education, due to the benefits it brings to students, preparing them to exercise their profession in various situations and contexts, and training them for life, in general.

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OPTIMIZATION OF THE TOPSPIN PERFORMANCE BIOMECHANICS IN FEMALE JUNIORS IN TABLE TENNIS

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Abstract. *The efficiency of the attack phase in table tennis is closely connected to the quality of the combination between effect and speed, being found in the ball takeover through topspin (a technical-tactical element), the optimization of the biomechanics of its execution representing a method of improving the hit and increasing the chances for winning points in the game. Aim: to create a program for improving the topspin attack, substantiated by optimising the biomechanics and the execution time by adopting some methods and means for correction and biomechanical strategies. Objective: to outline the main aspects necessary for technical training in youth table tennis. Themes: to construe the initial and final data in order to assess the efficiency of the program and to identify the top executions in order to create a model. The research engaged a number of 20 Romanian women athletes involved in high performance table tennis, with ages between 13-15 years. For data collection, analysis and interpretation, we used Excel, IBM SPSS Statistics 23 and Dartfish 360s. Results: the efficiency of forehand topspin is in a direct relation with the way the forehand retopspin and backhand topspin is influenced by the hitting angle, in the case of the forehand topspin, the execution speed being around 0"30, as compared to the backhand one, of 0"28. The conclusions of the paper underline that program implementation has led to the improvement of the topspin biomechanics, bringing 11-14% more in the execution speed.*

Keywords: *table tennis, biomechanics, topspin, female junior II.*

Introduction

In current table tennis, both for female and male, the topspin executed on both hitting sides represents the main element for initiating the attack, the quality of its execution influencing the chances of winning the ball exchanges and points in the game, the biomechanics, along with the player's movement abilities and positioning to the ball, being the factors which determine the success and efficiency of the attack, by using this element. Forehand topspin is considered one of the most frequent attack hits used in competitions (Negulescu, Mocanu, & Cristea, 2018), having a percentage of usage of 95.23% in the attack phase, as compared to its other specific elements, and for this reason, the optimization of performance biomechanics is a "must have" in our female juniors' journey to high performance.

The female junior II category is the period when the technical, tactical and physical elements are formed, as well as personality traits; during this period, the first aspects of individualisation appear, based on the skills manifested for a certain game profile; after completing this stage, the athlete must have a well-shaped game profile (Doboși, 2009, p. 33). Table tennis demands elaborate movements of the upper limb to manipulate the racket angle, which is why coaches and players need to understand the basic biomechanical principles and how to apply them to the different components or phases of strokes (Qian et al., 2016). Thus, our biomechanical analysis focused on the angles of the arm and forearm resulting during the execution phase; besides the lower body, the upper limb had a decisive role in the success of the execution.

"The forehand smash and topspin are the main technical-tactical elements of the attack phase in table tennis" (Yuqiang, Xiaodong, & Dandan, 2014), a situation which occurs both in women and men and represents one of the reasons of our research, especially as the women's technical-tactical manifestation is largely similar to men's, in the sense that they show high aggression in the game and, implicitly, mainly use the topspin for the initiation and completion of the attack phase. We must mention that the first 9 players in the Top 10 World Ranking, in February 2018 (ITTF, 2018), are offensive players, using frequently the topspin on both hitting sides in the initiation of the attack phase and completion of the point.

In a comparative study on the biomechanics of the smash and topspin using a Vicon Motion Capture System (Oxford, UK), made up of 6 high-speed cameras (240 Hz), Zhou (2014) has drawn the conclusion that the execution speed of the two elements is susceptibly equal, and the percentage connected to the time allocated to each phase necessary to the execution is also almost similar. These aspects highlight the importance of perfecting the technical-tactical element addressed in our research and its consistency in winning the point, knowing that the smash is the hit which many times ends a ball exchange with the victory of the one executing the topspin, being almost at the same level, according to the above-mentioned study.

During the Finals of the 2017 European Championships for Senior Teams (*LIEBHERR ITTF European Championships*, 2017), which took place in Luxemburg and was won by the Romanian women's team against the similar team of Germany, the quality of the backhand topspin and especially the forehand topspin made the

difference on the scoreboard; this aspect was observed by the spectators too, while the specialists considered it a certainty due to its omnipresence in the game, being also used by the defensive female player Ying Han (no. 9 in the World Ranking, in September 2017), a member of the German team, its usage being a prerequisite for performance and particularly high performance.

According to specialists in the area, spin and speed are two of the most important factors in winning matches in this athletic discipline (Wu et al., 1992), and topspin is a perfect combination of these aspects which give an important value to this technical-tactical element specific to the attack phase.

For the 19th edition of Asian Cadet and Junior Championships held in Doha (Qatar), Mulloy et al. (2014) performed an analysis of the technical-tactical elements that had brought most points in a set of the Cadet Singles Finals, the topspin leading with 14.9 winning hits, followed by the loop, with 7.2, and the push, with 7.1. The importance of this technical-tactical element studied by us is also mentioned in the study undertaken by Negulescu, Mocanu and Cristea (2018), where it is stated that, according to expert opinion (100%), most attacks are initiated with the forehand topspin, which is thought to be the element that creates the highest difficulty to the opponent, as compared to the backhand topspin (85.71%), which makes us pay more attention to optimising the forehand attack. The study was performed on 20 local female players belonging to the mentioned age group, involved in performance sports, for a period of 8 months.

Purpose

This study aims to create an optimal execution model and to design a program for improving the topspin attack in table tennis, substantiated by increasing the indices of the technical-tactical expression level in this age group, by adopting some methods, correction means and biomechanical strategies which favour performance.

Objectives

- Shaping the main aspects required for the technical training in youth table tennis;
- Adopting some computerised techniques for studying the biomechanics of executions completed with the attack through topspin in table tennis for this age category;
- Identification of the correlations leading to the creation of an optimal level for making the attack efficient;
- Knowing the execution time of the topspin, correlated with the angle between the arm and forearm in the 3 moments of the technical element execution, and identification of the best executions, as they can be compared with those of other subjects in the same age group.

Hypothesis

Using the software in order to analyse the biomechanics and execution speed of the hit performed with topspin will facilitate the understanding of aspects favouring and perturbing the winning of points in the game and will make the attack phase efficient.

Material and methods

The following methods were used in this research: informational-bibliographic study, pedagogical observation, audio-video recording, anthropometric measurements, the logical method, the black box, the mathematical and statistical method and the computer graphics method.

- Dartfish 360s, a biomechanical analysis software program, a Panasonic Full HD video camera and an analysis program, IBM SPSS Statistics – version 23, were used for the collection, analysis and interpretation of data.

The audio-video frames were recorded in different positions, such as frontally, from the side (past the net) of the table and behind it, with the purpose of capturing the most representative angles.

In order to perform the biomechanical analysis, sequences from the tests made up of the following technical-tactical actions (themes) were used:

- Butterfly (sending the ball only on the diagonal of the table or only in line, an aspect established before starting the action, using the topspin);
- Multi-ball training (topspin with forehand and then with backhand, with a backspin-type effect, performed from the areas corresponding to the two).

Results

“The science of physical activities cannot dispense with a series of mathematical means, out of which the statistical ones are of great importance” (Tüdös, 1980, p. 5).

Besides the desire to identify the moment, the area and the biomechanics of the skilful arm, we wanted to highlight the possibility of the correlation between the specific physical capacities of this discipline (coordinating capacities in speed conditions) and the success level of the forehand and backhand retopspin, as well as the connection between them. Pearson correlation coefficient (r) and associated probability (p) were calculated for identifying the possible correlations.

Pearson correlation coefficient shows if a dependency relation does or does not exist between two phenomena, as well as the correlation degree. The latter (noted with r) can take values between +1 and -1. As the value of the coefficient comes closer and closer to +1 or -1, the correlation is more and more accentuated, either in the same sense (+) or in the opposite sense (-). If the resulting probability is lower than the significance limit ($\alpha = 0.05$), it follows that the two variables are correlated. If $p > 0.05$, we will decide that the two variables are not correlated (Țarcă, 1998, pp. 433-444).

$$r = \frac{\sum XY - n\bar{X}\bar{Y}}{\sqrt{\sum X^2 - n\bar{X}^2} \sqrt{\sum Y^2 - n\bar{Y}^2}}$$

n - number of analysed cases;

X - vector with the values of the first variable;

Y - vector with the values of the second variable;

\bar{X} - average of X values;

\bar{Y} - average of Y values.

The obtained results are shown in Tables 1-3.

Table 1. *The progress level recorded in the three stages of executing the technical element, i.e. the topspin and its execution speed*

Hit part	Initial average grade	Final average grade	Increase/decrease in percentage
FHD (Forehand) Topspin. Hit preparation \angle^0	146.36	145	-0.929%
FHD Topspin. Ball hitting \angle^0	117.46	120.46	2.554%
FHD Topspin. End of movement \angle^0	78	87	11.53 %
FHD Topspin. Time necessary for execution, hundredths of a second	36	32	-11.111 %
BHD (Backhand) Topspin. Hit preparation \angle^0	92	95	3.261%
BHD Topspin. Ball hitting \angle^0	115.95	115	-0.819%
BHD Topspin. End of movement \angle^0	155.44	148.03	-4.7671%
BHD Topspin. Time necessary for execution, hundredths of a second	32.6	28	-14.110%

Note: \angle^0 - represents the angle formed by the forearm and arm in the 3 moments of execution; FHD (Forehand) - the hit executed from the handy arm side, with a pronation-type grip on the paddle; BHD (Backhand) - the hit executed from the side opposed to the play arm, with a supination-type grip on the paddle.

Table 2. *The existing correlations (which influence efficiency) between the forehand topspin and different aspects of technical nature (hitting angles, execution speed or retopspin)*

Topspin forehand	Pearson correlation coefficient	p
Topspin FHD - ball hitting \angle^0	0.608	0.004
Time necessary for execution in hundredths of a second	0.608	0.004
Retopspin FHD - ball hitting \angle^0	0.481	0.032
Retopspin BHD - preparation method \angle^0	0.486	0.030
Retopspin FHD - hit preparation \angle^0	0.553	0.011
Topspin BHD - ball hitting \angle^0	-0.561	0.013
Topspin BHD - Time necessary for execution in hundredths of a second	-0.603	0.005
Retopspin FHD - Time necessary for execution in hundredths of a second	-0.474	0.035

Note: \angle^0 - represents the angle formed by the forearm and arm in the 3 moments of the execution; Retopspin - technical-tactical element specific to the attack phase of the topspin takeover

Table 3. *The existing correlations (which influence efficiency) between the backhand topspin and different aspects of somatic and technical nature (hitting angles or retopspin)*

Topspin backhand	Pearson correlation coefficient	p
Top FHD - ball hitting \angle^0	0.608	0.004
Time necessary for execution in hundredths of a second	0.608	0.004
Diameter of the right hand - influence \angle^0 of hitting	0.705	0.001
Diameter of the left hand - influence \angle^0 of hitting	0.641	0.003
Retopspin FHD - ball hitting \angle^0	0.481	0.032
Retopspin BHD - hit preparation \angle^0	0.537	0.015
Retopspin FHD - hit preparation \angle^0	0.553	0.011
Body weight - \angle^0 ball hitting	0.541	0.017
Ball hitting - \angle^0 influence of the execution speed	0.523	0.021

Conclusions

Designing a program to improve the attack with topspin can be an efficient solution for a modern game, which will increase the chances of female juniors II to perform at the highest level; the audio-video recording and biomechanical analysis comparing the executions of top players, performed by specialised software programs, are unanimously approved in supporting the athletes' performance and development.

A training model for improving the attack with topspin in female juniors II:

- The daily practice of the element during the training sessions, based on the multi-ball training method using the backspin effect and no effect;
- Technical exercises for topspin consolidation with male partners;
- Sets – exercises where the athlete creates the opportunity for the opponent to initiate the topspin attack on both sides;
- The average execution speed of forehand topspin must not exceed 0.32 seconds, and for backhand, 0.28 seconds;
- The hit will be initiated on the forehand part, at an angle of 145^0 , and for backhand, at an angle of 95^0 between the arm and forearm;
- In the forehand topspin, the ball should be hit at an angle of about 120^0 between the arm and forearm, with the dexterous upper limb, and for backhand, the same limb, at an angle of 115^0 ;
- The hit completion will describe an angle of 87^0 between the arm and forearm for the execution from the dexterous part, and 148^0 for the backhand one;
- Monthly evaluation of the progress recorded as an execution method, but also as efficiency in the game, using measurement objectives;
- Developing movement at the table in order to cover with the forehand part a surface as large as possible for initiating the topspin attack, this hit imprinting the ball a combination of speed and effect higher than the hit with backhand, the pressure upon the opponent being due to the higher amplitude of the hit;
- Developing motor abilities of the entire muscle system towards the speed-strength coordination;
- Executing the elements at high speed in front of the trunk, with well-chosen timing, at the table (near it) and sending the ball cross and in line;
- Audio-video recording of the executions and their analysis, using a resolution of HD type and Dartfish 360s software;
- Convergence in executions to the values expressed by the top players from the next category, the biomechanical analysis being performed with images caught during the games they are playing at important contests, in their final stages (semi-finals, finals);
- Using the latest equipment (video-camera, computer software specialised in biomechanical analysis, computer, bats, tables, rubbery support areas);
- Performing exercises for the consolidation of the topspin near the table and at a half-distance, due to increased efficiency of the hits from the two mentioned areas.

In order to enter into the “intimacy” of this technical-tactical element with the purpose of optimising its execution, we believe it is necessary to study, in the future, the following constituent aspects or aspects which support the biomechanics: the distance between the lower limbs at the hit moment, the angle between calf and thigh, leg expansion, the muscle strength of the attack arm, the level of aerobic power and the influence of nourishment (carbohydrates versus proteins).

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THE NEED FOR COMPLEMENTARITY OF REAL AND VIRTUAL GAMES IN TRAINING TO INCREASE THE PERFORMANCE OF ATHLETES

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Abstract: *The playful aspect is vital in preparing athletes, as an important part of their activity, with profound implications on the process of self-knowledge and communication improvement, the increase in motivation and confidence, and has a strong contribution to group cohesion through the management of the group. The essential (core) component in sports training, the real-level game implementation, involves all management functions, namely: planning (and choice of the game according to the objectives and performance criteria set by the coach for each participant), organizing (with specific sport props and focused on the goal), control-assessment of the performance (of each athlete, according to the individual training plan) and activity improvement (to increase the recorded performance at both the individual and team levels). The role of the game is more important in team sports, where it contributes to synergy within the team and teamwork awareness that the results are greater than the sum of the individual members. Knowledge on virtual reality and augmented reality, as well as the use of new technologies, are a necessity in sports training. These new technologies are not an auxiliary adopted as a result of coach's willingness, competences and skills, but ensure a necessary virtual complementarity to the real play in achieving sports training and increasing the performance of athletes.*

Keywords: *new technology, virtual games, training, sport, management.*

Introduction

The study of games has been a constant concern for the creative science and cultural personalities from the Renaissance epoch until today. Games were defined, grouped and classified in the past century in the reference anthropology works of the Dutch Johan Huizinga (1938) and the sociologist Roger Caillois (1958), and at the 6th International Congress of Anthropology and Ethnology in Paris (1960), peaking, from our point of view, in 1986, with the paper of the French Pierre Parlebas about sports sociology. The overall conclusion is that the playful spirit is grafted directly on the trunk of main social activities, the engine of each society, and the game is the formula of transition from the realm of necessity to the one of freedom or, that is to say, the game/play is a cultural phenomenon where everyone can create a specific combination of freedom, gratuitousness (as expressing the Greek *paidia*) and rule (as expressing the Latin *ludus*).

Huizinga defines the play as a voluntary action or activity conceived as a goal in itself, developed between fixed limits of time and space and following a freely consented, but mandatory rule; this activity is accompanied by a state of tension, joy and consciousness to be something other than current life (Marcus, 2011, p. 385). *Mutatis mutandis*, the definition applies only partially or with some adaptations regarding the game used in the lesson of physical education and sport or the sports training. Within these activities, using the game is a voluntary action of the leader (teacher or coach), with the purpose of choosing a particular game to achieve a specific aim, by virtue of a teleology. The last part of the definition referring to the participant's state of mind, which remains the same, is fully valid, even if the work is carried out compulsorily (in the lesson provided by the school syllabus) or by free will (in performance training), i.e. the strain of self-knowledge and interaction (with alterity), the joy of effective communication through common understanding of the same message that determines a common action and the awareness of being something other than in daily life.

Caillois groups games into four categories, according to the way they are dominated by competition, chance, simulation or vertigo. Sports can be found in two categories: competition (running, wrestling, athletics, boxing, fencing, football, billiards and chess) and vertigo (horse riding, skiing and climbing). Even if the number and classes of sports exceed the provided classification, even if there are sports unfixed into these classes, but considered as being fundamental to basic training (swimming and gymnastics, for example), the competitive element of sport is well highlighted, by moving the emphasis from *paidia* to *ludus*, namely from entertainment and recreation to the known internal rules and commitments. Thus, from this perspective, one might see only the apparent simplicity of the Romanian coach Bompa's call: "Do not forget that the sport is just a game" (2003, p. 240).

Nevertheless, contemporary technological progress, with all its galloping rhythm, may alter the playful nature of sport, because many of the new products do not seem interested in the game itself and the way to improve performance, but in the audience, potential buyers and therefore the entertainment correlated with the economic factor. Are new technologies on virtual reality and augmented reality a necessity in sports training? Do they take

into account athletes' interests of moving faster, higher, stronger, or they just serve the need for empathy of the audience, being at the same time a source of profit?

Topic addressed

Approaching sport as a game, under its playful component, the physical education teacher or the coach could demonstrate their creativity in shaping activities by selecting and inserting games in the training program, while respecting the diversity principle, both in terms of trained subjects and teleology, purpose – general physical training, overall training, performance training. The sport as a game or the game integrated into all these activities involves human motor skills, but different from those involved in human existence in general, in the labour process and defence (Dragnea & Bota, 1999). Human movements become physical exercises when setting targets for the improvement and development of functional or mental abilities, or of some general physical indicators, and the theory of motor activities has obviously set its core subject relying on the data of other sciences, for example, psycho-pedagogy and management, which supply the instructional design models for teaching purposes of the main functions of quality management (plan-do-check-act).

The teaching design pattern used for sport training by Colibaba-Evuleț comprises five concrete stages operationalised through answers to five questions, the same for any teaching approach: What do I want to do? With what? With whom? In which way will I do it? How will I ensure its correct application in practice? How will I check the quality and effectiveness of training? If the coach has clear training objectives on the individual or team level, they will take into account all the input elements – the training resources, choose the type of necessary game to establish the instructional strategy, but perhaps the most difficult stage to go still remains, namely modelling the effort dynamics to achieve the best sporting shape (Dragnea & Bota, 1999).

One of the ideas we propose is the extension of modelling the effort dynamics from the lesson with a strictly determined frame and time to the overall training program that alternates frames and has varying objective or subjective time limits. The second idea is the extension of the effort concept from understanding it only as physical effort to the point of including mental effort too. The third idea is the inclusion of rest and recovery time into the instructional model, as active recreation, by exploiting the tendency of the subject belonging to the *touch screen generation* to escape into the cyberspace, in the interest of the planned program.

A recent study performed by the Romanian Institute of Educational Sciences and coordinated by Monica Cuciureanu (2014) highlights the crucial contribution of the Internet and virtual environments to the learning achievement. In the last decades, a new context that adjusts the position and resizes the learning concept has been created through the Internet and virtual environments. Defined as a modification of human behaviour that is settled by repeated experiences through the interaction with the environment, the learning has been diversified directly proportional to the diversification of learning environments, so that educational systems were forced to take into consideration the learning by discovery, collaborative learning, learning through research, which are nowadays highly valued by more and more subjects. Romanian researchers from the Institute of Educational Sciences are considering new definitions of learning, for example the one proposed by the German authors of a pedagogical dictionary, *Schaub and Zenke*, according to which the general indicator of learning is change. The change can mean learning or non-learning, adaptation or maladjustment. Experiences that support learning are related to the perceptions and information coming from the environment and their processing by the individual.

As regards the athlete, the learning occurs through specific motor skill exercises and thereby the modelling of effort dynamics is achieved. For example, accelerated running or the relay race is used for increasing and decreasing speed; the athlete becomes aware of the relationship between strength, power and speed – the stronger the ground force, the more the duration of the contact phase decreases and increases maximum speed (this one depends on the degree of applying the ground force to defeat gravity – in many ground sports, or the water force to defeat the water resistance – in aquatic sports).

Schmidt and Lee (2014) distinguish three main stages of motor skill learning: the verbal-cognitive, motor and autonomous ones. Mental training takes an important place in the second and third stages and could be developed in between practice repetitions or times of rest. This type of mental training is considered to be a very effective way to train high performance athletes and can be organized for different purposes – repetition of motor sequences, control of emotional states, gaining self-confidence, increasing emotional intelligence through better knowledge of oneself and others. Practicing under constant conditions in order to acquire the movement pattern or achieve the same goals as in the motor stage (for example, the development of speed and reaction used in the non-specific training phase, which is valid for both team games and overall training) could be facilitated nowadays through the virtual reality generated by the new technologies, by video games that the coach can include in the

extensive training program. Valuing the recovery time of the athlete by resorting to this kind of game over another one freely chosen by him/her for relaxation or entertainment intensifies the training program itself.

As stated in the study of the Romanian Institute of Educational Sciences, it is widely recognized that, in the current context, social learning and learning in authentic situations is preferred; informal education and non-formal education are “gaining momentum” against the formal one, which remains, in many respects, dependent on the traditionalist vision (Cuciureanu, 2014).

Mutatis mutandis, it must be accepted that, in sports training, with all the specificity of the learning process determined by the motor skill stage itself, new technologies play an important role in the programs and steps designed to reach performance. In other words, the coach not just has to keep up with current trends of social development, but must match their steps with the natural and impossible-to-be-repressed trends of the Facebook generation of athletes, trends that are time-consuming, mentally demanding and counterproductive if they are not *pro domo* guided by the coach through workloads (in fact, by mental training) intelligently laid out in traditional training cycles.

In the sports field, it is an obvious truth that there should be interdependence between the requirements for executing a skill and performance. We believe that the way of making the transfer of skills from the virtual to real environment is insufficiently explored, underlining that the target is not the transfer itself, but practicing the same skills in different environments. In this way, the athlete could be fully involved, while their resources are optimally used and their recovery time gains other meanings (due to the role of rebuilding, it becomes active rest). In addition, between the athlete’s will to escape from reality and the coach’s will to track the instructional objectives, a consistent performance benefit can be achieved.

The interview applied by researchers of the Romanian Institute of Educational Sciences to a representative sample of pupils has revealed that: “The thing with the computer game is not just a play (how some adults say, a.n.). There are difficult games using strategies (...). Mean resources are limited and you have to face many attempts in an increasingly complex context, and you cannot do it alone, you must collaborate. We learn to cope with crises, to know your opponent, to work in a team (...). And yes, it might be violent, but we can make the difference between game and reality” (Cuciureanu, 2014).

Virtual environment games boost interactivity, activism, the rapid processing of information, the adequacy of the response to unpredictable stimuli or those with a low predictability factor. Using the computer provides the feeling of freedom to choose contents of information, but concomitantly requires the development of specific operating skills, technical skills and also some cognitive and resolution skills (problem solving).

Therefore, it results that the coach has the role to develop these skills according to specific objectives and to integrate them into their educational programs, so that they could be used in an active learning process instead of remaining solely subservient to entertainment.

New technologies have introduced two new concepts seemingly irreconcilable with sports training, which requires anchorage to reality based on key parameters (space, time, mechanics and material properties), namely virtual reality and augmented reality.

Basically, an oppositional relationship is created between reality (the world where the motor skill training takes place), with all its physical peculiarities, and virtual reality (which produces an interaction with a completely synthetic world). Inside this real-virtual continuum, we find the “augmented reality”, a relatively new concept (assigned in 1990 to the professor and researcher Thomas Caudella) treated as an extension of reality by filling it with data elements submitted by a computer, with sensory entries such as sounds, video, graphics, GPS. In other words, it is similar to a simulation device, but going beyond its replicating functions of reality (because the real world is perceived through additional individual cognitive information that is artificially generated). “Virtual environments” is a collection of technologies that allow the user to interact effectively and in real time with computer-generated 3D modules by using their natural senses and abilities. Virtual environments have many functions including: offering the user immersive experiences, design of new concepts or products, exploring and analysing the data in an intuitive way, user training for potentially dangerous and complex tasks in a safe environment, entertainment (Covaci, 2013).

Areas that are advantaged by virtual environment exploitation are aviation, surgery, industries and cinematography. Regarding the sports field, the focus is shifted towards the sports receiver or consumer, who either plays virtually or uses different augmented reality devices, and thus immerses into the action and meets his or her own needs, including empathy (“putting him/herself in the shoes” of Messi or Federer, for example), which is fundamental. Empathy is the leitmotif of the TED (Technology, Entertainment and Design) Conferences (2012, 2014 and 2015) on augmented reality, where different specialists advance ideas and make demonstrations, but do not address the utility of new technologies from the perspective of the coach or athlete. The literature states that

virtual environment has the potential to train skills, but it is known that, when the conditions for practicing a skill change, the performance in the virtual environment does not manifest in the real world. Furthermore, it has been found that participants get to develop dependence on information available in virtual environments. However, all these issues are currently as many questions for researchers.

Nowadays, there are papers showing results in boosting sports performance through the use of simulators, for example improving the ability to throw a ball through a rugby simulator device or changing individual parameters for a handball goalkeeper by animating an avatar with data from a real player (Covaci, 2013). TED speakers bring into question team sports – rugby and football, presenting different devices or simply suggesting their existence; in any case, it clearly results the need for special facilities and equipment involving considerable investment (2015, 2014 and 2012, see the links from the reference section about virtual reality, augmented reality).

One aspect that is not at all taken into consideration is the relationship between player and the device that provides him/her with comprehensive information related to augmented reality; the need for some information selection skills, the speed of receiving and processing, decision-making and individual responsibility, all this raises the old issue of the relationship between human and machine in order to consciously use and select data, and not subordinate to them.

Even if the commercial aspect currently remains primordial, it is important to have knowledge about and to integrate new technologies into the traditional training program. As the Internet and mobile phones have changed the face of humanity in recent decades, some new technologies on virtual reality and augmented reality will join the Olympic motto “Citius, Altius, Fortius” through a direct contribution to developing skills and increasing the performance of athletes.

Conclusions

Using the game in the lesson of physical education or the training program is a voluntary action of the leader (teacher or trainer), in the sense of choosing a specific game in order to achieve a precise aim, therefore by virtue of a teleology. The teacher or trainer could demonstrate their creativity in shaping activities by selecting and inserting games in the training program, while respecting the diversity principle, both in terms of trained subjects and teleology, purpose – general physical training, overall training, performance training. The sport as a game or the game integrated into all these activities involves human motor skills, but different from those involved in human existence in general, in the labour process and defence. It also develops skills needed in individual team sports.

One of the ideas of this study is the extension of modelling the effort dynamics from the lesson with a strictly determined frame and time to the overall training program, including leisure or the recovery period of the athlete. Time for rest and recovery will be included into the instructional model, as active rest, by exploiting the tendency of the subject belonging to the *touch screen generation* to escape into the cyberspace, in the interest of the planned program.

Another idea of the study is the extension of the effort concept from understanding it only as physical effort to the point of including mental effort too; it is about the mental effort that the athlete uses in their spare time by accessing virtual environments as psychosomatic release. The power and art of coaching will also include modelling the dynamics of mental effort. Mental training, which takes an important place in the second and third main stages of motor skill learning, could be developed by using virtual environments, namely virtual reality games. This type of mental training is considered to be a very effective way to train high performance athletes and can be organized for different purposes – repetition of motor sequences, control of emotional states, gaining self-confidence, increasing emotional intelligence through better knowledge of oneself and others. Practicing under constant conditions in order to acquire the movement pattern or achieve the same goals as in the motor stage (for example, the development of speed and reaction used in the non-specific training phase, which is valid for both team games and overall training) could be facilitated nowadays through the virtual reality generated by the new technologies, by video games that the coach can include in the extensive training program. Valuing the recovery time of the athlete by resorting to this kind of game over another one freely chosen by him/her for relaxation or entertainment intensifies the training program itself.

Even though, theoretically, the sport is no more than a game, new technologies regarding virtual reality and augmented reality are less designed for the use of athletes and coaches, but rather for the need of empathy with the audience receiving and consuming sport, being at the same time a source of profit.

In sports training, with all the specificity of the learning process determined by the motor skill stage itself, new technologies play an important role in the programs and steps designed to reach performance. They could be

included in the training program and stages to complement the traditional training program. In addition, the coach will exploit more wisely, in their own interest, the time that the contemporary athlete allocates anyway to access virtual environments. Thus, the coach will keep up with current trends of social development and will match their steps with the trends of the Facebook generation of athletes or with the touchscreen trends to access virtual environments. The coach could pro domo guide them through workloads (in fact, by mental training) intelligently laid out in traditional training cycles.

In this integrative way, by following the traditional paths complementarily with the modern one, the athlete will be fully involved, while their time resources will be used optimally and their recovery time will gain other meanings by exploring new technologies.

Virtual environment games boost interactivity, activism, the rapid processing of information, the adequacy of the response to unpredictable stimuli or those with a low predictability factor. Using the computer or other technologies depends on the coaches' freedom in choosing contents of information and sustain the development of specific operating skills, technical skills and also some cognitive and resolution skills (problem solving).

Therefore, it results that the coach has the role to develop these skills according to specific objectives and to integrate them into their educational programs, so that they could be used in an active learning process instead of remaining solely subservient to entertainment..

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THE INCIDENCE OF SCAPULOHUMERAL DISLOCATION IN DIFFERENT SPORTS AND POSSIBILITIES OF THERAPEUTIC INTERVENTION

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Abstract. *In this study, we aimed to track changes in the flexibility of the scapulohumeral joint in athletes, after a practical recovery intervention. For this, we monitored the recorded changes and their type - progression, regression or stagnation - in the shoulder range of motion. We also aimed to see how an exercise programme using kinetotherapy equipment could influence and improve the shoulder position in injured athletes. The research hypothesis is that the mobility of the dislocated scapulohumeral joint improves after the implementation of an individualized recovery programme. The subjects were 20 male athletes aged 20 to 26 years, practicing handball (6), tennis (5), shot put (5) and swimming (4), who followed an 8-week programme, with a frequency of 3 times per week. The experimental research was conducted between October 2016 and January 2017 at a hospital in Baghdad. The findings show that the proposed exercises have reached their goals, progress being noticed in each patient. Therefore, we consider that the obtained results, validated by statistical calculations, confirm our research hypothesis.*

Keywords: *shoulder joint, dislocation, recovery, kinetotherapy, sport.*

Introduction

The shoulder joint, also known as the glenohumeral joint, is the most mobile joint in the human body, which links the free end of the upper limb to the shoulder girdle. It is a complex joint that provides increased mobility in the upper extremity and helps the individual to perform daily activities. This joint consists of the humerus (the upper arm bone), the scapula (the shoulder blade) and the clavicle (the collar bone), which are connected between them by ligaments, tendons, muscles and the articular capsule (Dhar, 2015). The shoulder must be mobile enough for the wide range actions of the arms and hands, but also stable enough to allow for actions such as lifting, pushing and pulling (Shoulder, 2016). Thus, the shoulder joint allows 180-degree rotation movements in three different planes, contributing to the performance of complex activities.

Dislocation is a traumatic disorder that consists in the complete separation of the bone extremities that make up a joint (Van der Windt et al., 1996). Shoulder dislocation usually occurs through an indirect mechanism. The patient falls on the shoulder, elbow or hand, with the arm in abduction, external rotation and retroduction. In this position, the humeral head is pushed between the anterior fibers of the articular capsule to the front of the glenoid cavity. Depending on the position in which the dislocated humeral head is placed relative to the glenoid cavity, there are four clinical types of dislocations, namely the anterior, posterior, inferior and superior ones (Stănculescu, 2004, p. 89).

Anterior shoulder dislocation occurs in the general population; however, the incidence is doubled in the young athletic population. Over 90% of shoulder dislocations are in the anterior direction. (Wang, Arciero, & Mazzocca, 2009) This means that the head of the humerus pops out in the forward direction, which usually occurs when an individual's arm is positioned above the head, and an unexpected small injury forces it a little bit further, pushing the shoulder into an extreme position which overcomes the structures that stabilize the shoulder joint, causing the head of the humerus to pop out of its socket (*Shoulder dislocation and instability*, 2011).

Medical recovery is particularly important in improving as much as possible the mobility of the shoulder joint. Kinetotherapy, along with electrotherapy and massage, plays an important role in preventing pain, regaining strength and stability, returning to daily activities and performing the controlled movement of the shoulder. The recurrence of shoulder dislocation can be reduced by continuing the physical therapy programme after the first episode of dislocation (Beckerman et al., 1993).

If initial dislocation is followed by episodes of recurrent subluxation, then avoidance of high-risk activity and a programme of muscle strengthening may still be effective. After the initial period of immobilization, the patient begins supervised physiotherapy exercises to prevent glenohumeral joint contracture, followed by dynamic exercises to develop dynamic stabilizers of the shoulder and improve proprioception in the joint (Cutts, Prempeh, & Drew, 2009). Expert opinion suggests that return is allowed when motion and strength are nearly normal, and the athletes can engage in sport-specific activities; however, the athlete is at risk for recurrence while playing (Kuhn, 2006).

Shoulder range of motion (ROM) is measured and documented in planes of movement such as flexion/extension, abduction/adduction and internal/external rotation (Khadilkar et al., 2014).

The functionality of a joint, with reference to the laxity-rigidity relationship, reveals both the genetic factor and the correlation between the range of motion and individual particularities (Macovei, 1999, p. 8). Several studies conducted on performance athletes highlight differences in the heritability coefficients according to the joint, the most genetically-dependent one being the scapulohumeral joint (Ifrim, 1986, p. 451).

Materials and methods

Premise. Mobility is a motor ability strongly influenced by the hereditary factor, but which can develop within the inherited limits, especially as regards its functionality and the elasticity of muscles and ligaments.

Purpose. We aimed to track changes in the mobility of the scapulohumeral joint in athletes practicing different sports, after a practical recovery intervention. For this, we monitored the recorded changes and their type - progression, regression or stagnation - in the shoulder range of motion. We also aimed to see how an exercise programme using kinetotherapy equipment could influence and improve the shoulder position in injured athletes.

Objective. To identify the influence of exercises aimed at developing flexibility and performed within an individualized kinetotherapy programme.

Hypothesis. The mobility of the dislocated scapulohumeral joint improves after implementing an individualized recovery programme.

Methods. Documentation, observation, induced experiment, mathematical and statistical methods

Period and location. The experimental research was conducted between October 2016 and January 2017 at the "Ipn Alcaf" Kinetotherapy and Recovery Hospital in Baghdad.

Subjects. 20 male athletes aged 20 to 26 years, practicing the following sports: handball (6), tennis (5), shot put (5) and swimming (4). Measurements were performed in the scapulohumeral joint to highlight its range of motion before and after performing the recovery exercise programme. Athlete selection took into account the severity of the dislocation and the period of time elapsed since the injury. The selected athletes were among those who had recovered by mobilization, not by surgery, and accepted the proposed programme. They followed an 8-week programme, with a frequency of 3 times per week. The scapulohumeral joint was tested using the goniometer and some specific tests.

Results and discussions

Normal ranges of the shoulder joint during various motions (measured using the goniometer) are the following:

Flexion - 0-170 degrees in normal conditions. Flexion was performed by moving the arm forward and upward, and measurement with the goniometer was made by positioning it at the shoulder level.

Extension - 0-60 degrees in normal conditions. Extension was performed by moving the arm to the rear of the body, and measurement with the goniometer was made by positioning it at the shoulder level.

Abduction - 0 degrees up to 170 degrees

Adduction - 0 degrees in normal position, reaching 130 degrees

Internal rotation - 60 degrees in normal position

External rotation - 80 degrees

Abduction-adduction. These movements are performed around an anteroposterior axis that passes through the lower part of the humeral head, in the front plane. Abduction to the horizontal position is achieved in the glenohumeral joint. Above the horizontal, the large tubercle hinders the movement, because it reaches the upper part of the glenoid frame. Consequently, the movement does not occur any longer in the glenohumeral joint, but becomes possible through the scapular tilting motion. With the goniometer, we measured the abduction of the arm moved upward and laterally to the body. For the adduction movement, measured with the goniometer, we used the following approach: from the horizontal position of the arm, this one was moved horizontally forward.

Internal (medial) rotation and external (lateral) rotation are performed around a vertical axis that passes through the central part of the humeral head and capitulum. This complements the pronation-supination movements of the forearm. The shoulder girdle antepulsion contributes a lot to internal rotation, and the scapulothoracic retropulsion facilitates external rotation. For the internal rotation movement, we started from the arm position close to the body, with the forearm raised and forming a 90-degree angle with the arm. Goniometer measurement is initiated in this position, and this is done by positioning it under the elbow (starting at 0 degrees) and moving the forearm to the abdomen. The external rotation movement is achieved conversely to the internal rotation movement.

The goniometer test was performed in the initial and final stages for the above-mentioned movements.

Test assessment

Test 1. Medicine ball throw: sitting on a chair, raise a 2-kg ball overhead with both arms and throw it forward. This test helps to measure the joint strength. If the scapulohumeral joint is affected, the ball will be thrown to a distance of about 3 meters; in the case of a recovered joint or in normal conditions, when the joint is not affected, the ball can reach the distance of 6-7 meters. Measurements in this test are made with the meter.

Test 2. Flexibility with the gym stick: grasp the stick with both hands, with your arms down in front of your body and raise them up and forward while holding the stick. If the joint flexibility is affected, the arms will open outward on the stick, and if the joint flexibility is normal, the arms are raised up in the same starting position, without spreading them apart. Measurements in this test are made with the centimeter.

Proposal for a rehabilitation programme

Rehabilitation in the maximum joint stability position (MJSP): learning the MJSP; isometric muscle toning in MJSP; proprioceptive rehabilitation in static MJSP. Rehabilitation in other shoulder joint sectors: starting from the MJSP to the more unstable joint sectors and progressing to the dangerous area: in each intermediate position - isometric muscle toning; static proprioceptive rehabilitation; once a position is integrated - isokinetic muscle toning of the MJSP in the new position and return; dynamic proprioceptive rehabilitation.

Global postural and gestural rehabilitation specific to the practiced sport and the type of instability: correction of the general scapulohumeral statics for each posture adapted to the sport gesture concerned; myo-aponeurotic stretches derived from the sport gesture; isokinetic muscle toning of the functional muscle chains for the sport gesture.

The programme was conducted over 8 weeks, in the conditions shown in Table 1.

Table 1. Programme designed for the selected subjects

Week no.	Number of units	Exercise intensity	Rest between reps	Number of reps
Week 1	1	60%	65 sec	3
	2		65 sec	3
	3		65 sec	3
Week 2	1	65%	65 sec	3
	2		65 sec	3
	3		65 sec	4
Week 3	1	70%	75 sec	4
	2		75 sec	4
	3		75 sec	4
Week 4	1	65%	70 sec	4
	2		70 sec	4
	3		70 sec	5
Week 5	1	70%	75 sec	5
	2		75 sec	5
	3		75 sec	5
Week 6	1	75%	80 sec	4
	2		80 sec	4
	3		80 sec	4
Week 7	1	80%	90 sec	4
	2		90 sec	4
	3		90 sec	3
Week 8	1	75%	75 sec	4
	2		75 sec	4
	3		75 sec	4

Exercise description

1. Raise the gym stick. Description: grasp the stick and swing your arms up and down (10 times x 2)
2. Ball exercise. Description: sit on the mat with your knees bent and hold the ball with both hands. Lie down on your back while holding it, stand up, throw it and return to your initial position (20 times x 4)
3. Throw the ball down. Description: in the standing position, hold the ball with both hands and, when throwing the ball down, raise your arms up and bend your torso sideways (20 times x 4)

4. Pull up to the rear. Description: in the standing position, fix an elastic band under your foot and pull its other end up to the rear while slightly bending your knee (20 times x 3)

5. Lower lateral pull. Description: in the standing position, fix the end of an elastic band to a high place and pull the other end to the lower lateral side while slightly bending your elbows (20 times x 3)

6. Internal rotation. Description: in the standing position, fix one end of the elastic band to the wrist and pull the band inward, by rotating it only with your elbows (20 times x 3)

7. External rotation. Description: in the standing position, fix one end of the elastic band to the wrist and pull the band outward, by rotating it only with your elbows (20 times x 3)

8. Downward and inward pull. Description: in the standing position, fix one end of the elastic band up and pull the band downward and inward (20 times x 3)

9. Upward and outward pull. Description: in the standing position, fix one end of the elastic band down and pull the band upward and outward (20 times x 3)

The results for all measurements have improved, which is revealed by the statistical calculation of the following parameters: arithmetic mean, difference (I-F), median, standard deviation, coefficient of variation, minimum, maximum, dependent t-test (I-F) and calculated t-value. The test results were analysed using the SPSS program, variant 15, by the mathematical and statistical method.

Results obtained using the goniometer

- Flexion. The obtained values significantly increased statistically between the two tests (an average increase of 124.15 degrees), from 45.15 to 169.30. The increase is given by the calculated t-value (-56.077), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 21% in the initial testing and 1% in the final testing (Table 2).

Table 2. Flexion – Descriptive data

	Initial testing (I)	Final testing (F)
Number of cases	20	20
Arithmetic mean	45.15	169.30
Difference (I-F)		+124.15
Median	41.00	170.00
Standard deviation	9.59	1.03
Coefficient of variation	21%	1%
Minimum	30.0	167.0
Maximum	62.0	170.0
Dependent t-test (I-F)	Calculated t-value	-56.077
	p	0.000

- Extension. The obtained values significantly increased statistically between the two tests (an average increase of 37.65 degrees), from 21.85 to 59.50. The increase is given by the calculated t-value (-68.574), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 9% in the initial testing and 1% in the final testing (Table 3).

Table 3. Extension – Descriptive data

	Initial testing (I)	Final testing (F)
Number of cases	20	20
Arithmetic mean	21.85	59.50
Difference (I-F)		+37.65
Median	22.00	60.00
Standard deviation	2.03	0.89
Coefficient of variation	9%	1%
Minimum	18.0	57.0
Maximum	25.0	60.0
Dependent t-test (I-F)	Calculated t-value	-68.574
	p	0.000

- Abduction. The obtained values significantly increased statistically between the two tests (an average increase of 109.25 degrees), from 59.40 to 168.65. The increase is given by the calculated t-value (-2.820), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 4% in the initial testing and 1% in the final testing (Table 4).

Table 4. *Abduction – Descriptive data*

	Initial testing (I)	Final testing (F)
Number of cases	20	20
Arithmetic mean	59.40	168.65
Difference (I-F)		+109.25
Median	60.00	169.00
Standard deviation	2.35	1.60
Coefficient of variation	4%	1%
Minimum	54.0	165.0
Maximum	62.0	170.0
Dependent t-test (I-F)	Calculated t-value	-321.977
	P	0.000

- Adduction. The obtained values significantly increased statistically between the two tests (an average increase of 87.20 degrees), from 42.60 to 129.80. The increase is given by the calculated t-value (-174.217), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 5% in the initial testing and 0% in the final testing (Table 5).

Table 5. *Adduction – Descriptive data*

	Initial testing (I)	Final testing (F)
Number of cases	20	20
Arithmetic mean	42.60	129.80
Difference (I-F)		+87.20
Median	43.00	130.00
Standard deviation	2.33	0.41
Coefficient of variation	5%	0%
Minimum	40.0	129.0
Maximum	48.0	130.0
Dependent t-test (I-F)	Calculated t-value	-174.217
	P	0.000

- Internal rotation. The obtained values significantly increased statistically between the two tests (an average increase of 33.25 degrees), from 26.45 to 59.70. The increase is given by the calculated t-value (-59.231), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 9% in the initial testing and 1% in the final testing (Table 6).

Table 6. *Internal rotation – Descriptive data*

	Initial testing (I)	Final testing (F)
Number of cases	20	20
Arithmetic mean	26.45	59.70
Difference (I-F)		+33.25
Median	26.50	60.00
Standard deviation	2.50	0.57
Coefficient of variation	9%	1%
Minimum	20.0	58.0
Maximum	31.0	60.0
Dependent t-test (I-F)	Calculated t-value	-59.231
	P	0.000

- External rotation. The obtained values significantly increased statistically between the two tests (an average increase of 36.95 degrees), from 41.95 to 78.90. The increase is given by the calculated t-value (-49.593), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 7% in the initial testing and 2% in the final testing (Table 7).

Table 7. *External rotation – Descriptive data*

		Initial testing (I)	Final testing (F)
Number of cases		20	20
Arithmetic mean		41.95	78.90
Difference (I-F)			+36.95
Median		41.50	80.00
Standard deviation		3.05	1.37
Coefficient of variation		7%	2%
Minimum		37.0	76.0
Maximum		47.0	80.0
Dependent t-test (I-F)	Calculated t-value P		-49.593 0.000

Results obtained in specific tests

- Flexibility with the gym stick. The obtained values significantly decreased statistically between the two tests (an average decrease of 89.45 m), from 101.20 to 11.75 m. The decrease is given by the calculated t-value (67.928), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 5% in the initial testing and 17% in the final testing (Table 8).

Table 8. *Flexibility with the gym stick – Descriptive data*

		Initial testing (I)	Final testing (F)
Number of cases		20	20
Arithmetic mean		101.20	11.75
Difference (I-F)			-89.45
Median		100.00	12.00
Standard deviation		4.95	2.00
Coefficient of variation		5%	17%
Minimum		90.0	8.0
Maximum		110.0	15.0
Dependent t-test (I-F)	Calculated t-value p		67.928 0.000

- Medicine ball throw. The obtained values significantly increased statistically between the two tests (an average increase of 4.02 m), from 2.06 to 6.07 m. The increase is given by the calculated t-value (-51.771), as a result of applying the dependent t-test, the p-value being less than 0.05 ($p=0.000$). The homogeneity of the group is high in both tests, the coefficient of variation having the value 10% in the initial testing and 5% in the final testing (Table 9).

Table 9. *Medicine ball throw – Descriptive data*

		Initial testing (I)	Final testing (F)
Number of cases		20	20
Arithmetic mean		2.06	6.07
Difference (I-F)			4.02
Median		2.10	6.00
Standard deviation		0.20	0.30
Coefficient of variation		10%	5%
Minimum		1.5	5.5
Maximum		2.4	6.8
Dependent t-test (I-F)	Calculated t-value P		-51.771 0.000

Conclusions

- Recovery exercises achieved with specific equipment are beneficial to the health of the body, but especially to a scapulohumeral recovery.
- Exercises proposed in the study have reached their goals, progress being noticed in each patient.
- Exercises using kinetotherapy equipment successfully contribute to the scapulohumeral recovery.
- Through this study, we can highlight the importance of achieving a flexibility programme in the recovery of the scapulohumeral joint, but also in maintaining the health of the body and its joints.
- It has been confirmed that flexibility exercises are very important in recovering the shoulder joint, together with the recovery exercises performed with kinetotherapy equipment, all of them forming a unitary whole that helps the patient to fully recover the scapulohumeral joint function.
- We consider that the obtained results, validated by statistical calculations, confirm our hypothesis.

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PATHOLOGICAL STATE ASSOCIATED WITH A MOSTLY MODERATE INTELLECTUAL DEFICIENCY CONSECUTIVE TO A CEREBRAL LESION

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Abstract. *Analysing the causes of cerebral motor infirmity (CMI) in patients, it has been concluded – actually, generally admitted that the following factors contribute to the complexity of remarked aspects: sensory disorders of different levels, spasticity, disorder of the postural reflex mechanism, lack of selective movement modalities. Sensory disorders are, in the majority of cases, the result of increased muscle tone. Increased tone and uncoordinated movements determine monstrous sensory images in the proprioceptors, which increase, in their turn, motor disorder. Each of these factors has its characteristics and specific features. There are methods that can help us in the treatment of CMI. We will present a point of view on some of them. Therapeutic education (Le Metayer – a relaxation technique for the spastic upper limb, without the intervention of global ways, which was proposed by Bobath), where Matieu and subsequently Le Metayer introduce the association between the terms of education and therapy; global stimulation (Vojta); Kabat method – appeared as a refinement of Kenny's method.*

Keywords: *cerebral palsy, therapeutic education, Kabat method, global stimulation.*

Introduction

Cerebral motor infirmity (CMI), as Pasztai (2004) notes, is caused, in the global neurological action, by a congenital cerebral lesion (anomaly of development in the course of the first pregnancy term) or a contracted one (produced by difficult birth or accidental trauma in the first months of life) and is demonstrated as follows: forms of spastic palsy with different sites, motor incoordination, slow and wavy involuntary movements, delay in mental development, sensory disorders and sometimes a visual or hearing impairment (p 18).

Analysing the causes of cerebral motor infirmity in patients, it has been concluded – actually, generally admitted that the following factors contribute to the complexity of remarked aspects:

1. Sensory disorders of different levels;
2. Spasticity;
3. Disorder of the postural reflex mechanism;
4. Lack of selective movement modalities.

Sensory disorders are, in the majority of cases, the result of increased muscle tone. Increased tone and uncoordinated movements determine monstrous sensory images in the proprioceptors, which increase, in their turn, motor disorder.

Sensory disorders can be:

- tactile discrimination disorders;
- position estimation disorders;
- movement estimation disorders;
- astereognosis – disorders of spatial and corporal perception.

Therapeutic education (Le Metayer)

Matieu and subsequently Le Metayer introduce the terms of education and therapy, whose association is justified. Motor handicap is scheduled in three essential groups corresponding to the respective clinical disorders.

- Spasticity – the pyramidal syndrome, characterised by the exaggeration of extension reflex, impairs the whole body (diplegia/tetraplegia), only the lower limbs (paraparesis/spastic paraplegia) or half of the body (hemiparesis/spastic hemiplegia);
- Dyskinesia – the extrapyramidal syndrome manifests in different forms: athetosis, but also tremor, dystonia, rigidity;
- Ataxia – the cerebellar syndrome is characterised by disorders in coordination, accuracy and posture.

In reality, they lose their significance because, in the majority of cases, the symptoms are combined: spasticity is associated with athetosis or non-intentional movements, hypotonia etc.

The contracture is the functional disorder of a muscle or muscle group, being characterised by a continuous muscular contraction. The permanence of this abnormal state leads to the shortening of a muscle and the lesion organization (fibrosis of elastic muscular tissue), which is called “muscular retraction”. The difference between these two states is often made only under anaesthesia: muscular contracture gives up only under anaesthesia.

Le Metayer, a relaxation technique for the spastic upper limb, without the intervention of global ways, was proposed by Bobath. Relaxation manoeuvres are performed in comfortable and relaxing positions for the patient, so that values on the Modified Ahsworth Scale (MAS) for spastic muscles are not influenced by additional efforts.

The proposed positions are:

- Sitting – for patients who have reached this stage (have appropriate muscle tone in the back muscles, have reactions of getting upright from this position and holding it without major effort);
- Dorsal decubitus – for patients who cannot hold their heads and for large-sized patients, who perform relaxation manoeuvres with difficulty.

Global simulation

According to Pasztai (2013, pp. 146-150), the Vojta therapy is mainly based on the following ideas:

1. Any posture or way of movement is powerfully imprinted in sub-cortical areas and is genetically inborn. Scoliosis, an adverse attitude, can also be considered a “scheduling mistake”, with a visible expression in the posture and movement.

2. The “ideal motor ability”, with all its fine movements and balance reactions can be re-established;

3. Reflex locomotion can be activated and used throughout life by any person with disorders of different aetiologies (neurological, congenital ones etc.);

4. In the case of any postural deficiency (kyphosis, scoliosis) or movement deficiency, reflex locomotion can be used. The sooner the therapy begins, the more efficiently it can act against postural and movement disorders;

5. By the application of “Vojta therapy to scoliosis and other postural deficiencies, a clear improvement of posture can be achieved, and therefore a correction of those postural disorders”.

Therapy principles:

1. Reflex locomotion will be performed in well-determined initial positions.

2. In order to set off reflex locomotion, it will be stimulated by pressure with tri-directional vector areas or well-delimited points.

3. Initial position, the direction of stimulating strength and the pressure period will be chosen and customised, adapted for each patient.

The areas of stimulation and the stimulus: Dr Vojta describes new different areas and two so-called “areas of resistance” which, in their turn, have been found empirically. Reflex locomotion will be initiated by combining both different areas of stimulation and the stimulus of pressure and traction. The patient reacts by a motor response that can be very accurately predetermined. The quantity of stimulus (number of areas – summed in space) and the period of stimulation (summed in time) are the elements that can be modelled and have a great importance. Some motor responses will be locked by counter-resistance (meaning that isotonic contractions will be converted into isometric ones). Thus, the muscle chains will receive opposite stimulus, which is compulsory for the adjustment of balance reactions between muscular groups around the joints (in this case, balance means the centring of spherical joints, the average position of the segment in a plane etc.). On repeated stimulation, the intended reflex locomotion is initiated, depending on the infantile palsy, thus settling the sensory motor way that facilitates global motor processes. By reflex locomotion, sub-cortical physiological schemes “blocked from different reasons” (non-identified in all cases) will be made operational and thus the patient will find alone “the way” towards his or her own central nervous system, with resources of self-correction. For example, in scoliosis, by “imprinting” reflex locomotion, the muscular groups which cannot be involuntarily activated are “touched” (activated). These are the “own” muscles (short rotator muscles) of the spine.

Kabat method

Kabat method appeared as a refinement of Kenny’s method. Doctor Herman Kabat considered it to be limited and local and thought that an improvement would be necessary. The method appeared as a consequence of the development of new physiopathology notions related to movements, their automatism and sub-cortical importance in physiology.

Drăgan (2011, p. 28) writes that this method is based on two central ideas:

- Subliminal arousal necessary for the execution of a movement can be enhanced, facilitated with a stimulus from other sources.
- Maximum facilitation is obtained by intense exercise with maximum effort under resistance.

In other words, a stimulus on the cells of the anterior horn of the spinal cord arouses some motor neurons to exceed their threshold and discharge afferent impulses to the muscles, while many other cells of the anterior horn from the same metamere do not reach more than a subliminal level. Summation of subliminal arousals of these

cells with other sources of arousal can bring the level of arousal of these neurons up to the threshold, intensifying the motor response by the additional recruitment of some motor groups – facilitation (Robănescu, 1992, p. 132).

The same author (Robănescu, 1992, p. 134) concludes that the emphasis is put on avoiding excessive work, which is why many exercises will be done passively and with assistance, the fatigue being thus prevented as much as possible.

As Dr Kabat has remarked, in the assisted movement, just a small number of all muscular groups are active within a single effort. Thus, he considers this is a shortage that will be compensated for by the rule: “a maximum response will be obtained by a maximum effort”.

Within this method, the means used for facilitation are the following:

- Maximum resistance – is opposite to the patient’s active movement up to its cancellation, forcing the muscle to contract isometrically. This concept is in line with the actual trends according to which isometric contraction is the most beneficial for increasing the functional capacity of a muscle.
- Extension – muscle elongation – according to Kabat, a paralysed muscle becomes active if certain resistance is applied to it. Thus, in the case of spastic palsy, antagonist contraction will not be decreased for antagonist re-education. Antagonist extension, when the muscle is clearly spastic, may inhibit both the movement and the facilitation of active contraction of the antagonist muscle.
- Global schemes of movement – gradual muscle contraction is performed by a stream of impulses left from the respective motor area of the brain cortex towards functionally correlated muscular groups, a phenomenon known as “radiation”. The principle governing this technique is that the radiation in muscle groups increases if the resistance increases in the muscular group which constitutes the facilitation source. The harder the contraction of the muscle group constituting the source of facilitation, the higher the radiation in the associated muscle groups. Exercises are also executed against an opposite resistance of pulleys with weights, weightlifting or boots with weights. More simple schemes can also be applied against resistance in some activities such as crawling or rolling over, these aiming to prepare the patient for rising to the bipedal position and for walking. These mainly use the static reactions of balance.

Topic addressed

Having the sense of posture injured, without orientation in space, these patients are not able to correctly direct a movement. For the spastic child, these disorders are more serious, because they have never had a correct perception, and therefore they do not have a correct kinaesthetic picture.

Spasticity is the result of releasing tonic reflex activity. The cause of motor disorders is largely due to releasing the primitive reflex ways of posture and movement under cortical inhibition (lesions of the pyramidal corticospinal tract and reticulospinal tract). Central inhibition is not a phenomenon entirely developed at birth, but occurs, for many motor acts, in the same time with the evolution of a person.

Disorder of the postural reflex mechanism:

- avoid performing active movements which are the basis of automatism. This automatism is gained in the first 5 years of life, and normal coordination of these fundamental movements is essential for the correct learning of functional activities. From a therapeutic point of view, there are three groups of automatic postural reactions:
 - reactions of lifting;
 - reactions of balance;
 - adaptive reactions of the muscle tone, as protection against gravity forces.

Manole (2009, p. 101) addressed this topic and notices that the lack of selective movement modalities is present in all cases, except for the very easy ones, and that it is important to retain that we cannot treat all patients in the same way, or we cannot prescribe them the same set of exercises. Each patient has different needs and requires a customised schedule of therapy. The treatment is based on two principles: the inhibition or the suppression of tonic reflex activity, which results in decreasing and adjusting the muscle tone. Facilitating the integration of superior reactions of lifting and balance in their sequence of adequate development is followed by progress in elementary activities.

Conclusions

As the causes of cerebral motor infirmity vary from patient to patient, it has been concluded – actually, generally admitted that the following factors contribute to the complexity of remarked aspects: sensory disorders

of different levels, spasticity, disorder of the postural reflex mechanism, lack of selective movement modalities. Each method has benefits, and patients had good response using it; however, there is not yet a unique way to act in using these methods. As is known, therapeutic education (Le Metayer – a relaxation technique for the spastic upper limb, without intervention of global ways, which was proposed by Bobath) is a concept where Matieu and subsequently Le Metayer introduce the association between the terms of education and therapy; global stimulation (Vojta) and Kabat method (appeared as a refinement of Kenny's method) refer to choosing the best way to apply these methods and to get the best results in therapy.

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