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**EXPERIMENT ON TEACHING MINI FOOTBALL TO CHILDREN
WITH DOWN SYNDROME**

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Abstract

In the framework of cooperation undertaken by the Russian State Social University and the Downside Up Charitable Foundation, a research group, with support of FIFA's social program "Football for Hope", has been implementing since 2015 an experiment for teaching Down syndrome children to play mini football. The object of the comprehensive study is development of Down syndrome children engaged in playing mini football. The subjects of the comprehensive study are: the impact of mini football sessions on the improvement of Down syndrome children's physical assets; the impact of mini football sessions on the children's morpho-functional indicators; the technical instruction of the Down syndrome children playing mini football; and physical rehabilitation of the Down syndrome children by means of adaptive sports, such as mini football. The first stage of experiment is teaching the elements of playing mini football. The following results were obtained: primary skills of ball control; positive dynamics both in physical and psychic development of children; increased working capacity; improved mental concentration and improved memory. At the second stage of the experiment, work continues on improving the acquired skills in compliance with the authors' experimental model; also, practical recommendations are elaborated for using the approved methods of teaching in other regions of Russia.

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1. Introduction

The problems of people with Down syndrome are dealt with in many research works. As early as thirty-five years ago, this phenomenon was believed to be an illness, and efforts were made to find a treatment for it (Givovich et al., 1982). The research was conducted on the psychological health and Down syndrome (Mental health and Down syndrome, 2000), and investigations were carried out in the medical and social aspects of the Down syndrome (Castro Lobera, 1993). Anyway, in the twenty-first century, an opinion prevailed that “the Down syndrome is not a disease but a genetic deviation and that people with Down syndrome are not ill and do not “suffer” from this condition” (Down’s Syndrome Association, 2014/15, 2). However, due to deviations in their health, for such people, especially children with Down syndrome, the problems of rehabilitation and social adaptation, especially by means of adaptive physical culture and sports (Makhov et al., 2015; Makhov & Zubenko, 2017), still remain burning issues (Petrova, 2015).

1.1. Physical rehabilitation and social adaptation of children with Down syndrome

Many research works are known on the subject of improving the physical fitness of young people with Down syndrome by means of aerobics (Casajus et al., 2012), on possibilities and restrictions in involving children and young people with Down syndrome in physical activities (Downs et al., 2013), and their physical interaction with the environment (Galli et al., 2016). In recent years, ever more researchers focus their attention on the development of motor and cognitive functions in children with Down syndrome (Kim et al., 2017), the impact of training on the muscular strength and postural balance of children with Down syndrome (Eid et al., 2017), analysis of emotions and the building of a model of a regulated interaction of people with Down syndrome (Altan Akin & Gokturk, 2017).

According to statistics, every 700th child in the world is born with Down syndrome. This ratio is the same in different countries, climatic zones, and social strata. This does not depend on the parents’ lifestyle, their health, harmful addictions, color of their skin, and ethnicity. In Russia, around 2,500 children with Down syndrome are born each year. The overwhelming majority of children with Down syndrome can learn to walk, eat, dress themselves, talk, play, and pursue sports. There is no doubt today that children with Down syndrome are teachable (Down’s syndrome, 2017). Physical culture and sports not only improve the children’s condition, but also help in their development, and physical and social rehabilitation. The pursuit of sports accustoms to discipline, teaches how to perform in a team, and fosters aspiration for higher achievements. The children with specific development do not always acquire such skills and it is the sport that helps them obtain all this quite naturally.

The leading specialists believe that sports are an essential component of the harmonic development of children with Down syndrome. Participation in sporting events improves cognitive activity of a child with Down syndrome, develops his speech abilities, positively impacts his social life and emotional condition. As a consequence, the psychological condition of the child stabilizes and his character takes shape (Koloskov, 2017).

There are plenty of sports accessible to children with Down syndrome. Among them there are gymnastics, swimming and many others, including, of course, football as a game full of entertainment,

requiring a comprehensive fitness and promoting collective thinking (Benefits of gymnastics for children with Down syndrome, 2017; Football is joy, this is fun!, 2017). Such aspects are believed to be extremely important for physical rehabilitation and social adaptation of people with a deviation in health.

1.2. Football as a means of physical rehabilitation and social adaptation of children with Down syndrome

Football, as a means of physical rehabilitation and social adaptation of people with Down syndrome, has found the widest use in the country of its origin. In 2006, the Down Syndrome Association, UK, has launched the DSActive programme in order to give people a chance of fair and competitive participation in the game of football. Today, DSActive embraces over 40 football clubs operating in England and Wales. They are accessible to and suited for all age groups and players with different capabilities (About DSActive, 2017). In the UK, over 600 people with Down syndrome are engaged in football. Over 100 coaches and volunteers work with them. Notably, many such teams have been formed at major football clubs (Football is joy, this is fun!, 2017).

Also, things got moving in Russia where immediately an emphasis was put on children's programmes. Under the programme "Sport for Common Good. Children", a research group of the Russian State Social University headed by the dean of the department of physical culture of the University, member of the Russian Paralympic Committee, doctor of pedagogical sciences A.S. Makhov, an experiment is underway since 15 December 2015 to teach two groups of children with Down syndrome, aged 7 to 18 years, to play mini football. FIFA provides a serious support to the research project being implemented in Russia for the first time (Downside up, RSSU and FIFA: to help children with Down syndrome learn to play football, 2017).

2. Problem Statement

The social adaptation of people with restricted capabilities is impossible without their physical rehabilitation which is understood as the use of physical exercises and motor activities in the comprehensive process of restoration of functions and strengthening of the organism's physical condition. These processes are particularly important for children with deviations in health, especially, for development of children with Down syndrome.

In the course of football training sessions, it is necessary to permanently monitor the progress of physical assets (agility, quickness, rapid strength, strength, flexibility, and endurance) in order to individualize the players' training and correct the teaching and training process.

The proposed hypothesis of the research is the assumption that the regular pursuit of football will promote the progress of not only physical abilities, but also the growth of morpho-functional indicators and those of technical skills in children with Down syndrome.

3. Research Questions

The chief task of the comprehensive study made as part of the experiment under way is determination of an impact of football sessions on physical rehabilitation and social adaptation of children

with Down syndrome. Thus, the physical and social development of children with Down syndrome pursuing football is the object of investigation. The subjects of the comprehensive research are:

- physical capabilities of children with Down syndrome;
- morpho-functional indicators of children with Down syndrome;
- technical instruction of children with Down syndrome in mini football;
- physical rehabilitation of children with Down syndrome.

Accordingly, the tasks of the investigation are:

- determination of the impact of playing mini football on physical capabilities of children with Down syndrome;
- determination of the impact of playing mini football on morpho-functional indicators of children with Down syndrome;
- revealing the dynamics of results of technical teaching mini football to children with Down syndrome;
- elaboration of methods of playing mini football for a comprehensive programme of physical rehabilitation of Down syndrome children;
- estimation of physical rehabilitation and social adaptation of children with Down syndrome by means of mini football as an adaptive sport.

4. Purpose of the Study

The aim of the experiment is a comprehensive study of the impact of playing mini football on the development of children with Down syndrome, including the changes in indicators of fitness and morpho-functional indicators as well as elaboration and introduction of methods of technical instruction and evaluation of its results.

5. Research Methods

5.1. Methods of the physical fitness research

Well known methods and tests with some modification are used to determine the physical fitness parameters. Those include the reduction of distance, equipment weight and changes in start-up positions. Tests were carried out to determine quickness, coordinating capabilities, endurance, rapid strength, flexibility, and strength.

5.2. Methods of morpho-functional indicators research

To determine the results of changes in morpho-functional indicators in children of the group being tested, measurements are employed that estimate the height and weight ratio, the maximum oxygen consumption, step length, step width, foot turn angle, post-training condition, and myofasciography for estimating the positive dynamics of functional indicators. The innovative method of myofasciography makes it possible to judge about the functional condition of skeletal muscles of the musculoskeletal system and individual muscle groups innervated through individual segments.

5.3. Methods of the technical skills research

The method of developing technical skills includes an individual approach with generally accepted techniques of combining training in football and dedicated physical exercises. For evaluating the results, tests are used for assessing the dribbling speed, ball trapping and control (a system of points), pass precision (a system of points), precision and strength of kicking a ball rolling to the goal, precision and strength of kicking an immobile ball toward the goal, registration of technique performance and the number of mistakes in performing the exercise.

5.4. Methods of physical rehabilitation research

For researching the physical rehabilitation, functional samples are taken to determine the functionality of the heart and lungs by measuring the following indicators:

- heart beat frequency (HBF);
- arterial blood pressure (ABP);
- breathing movement rate (BMR)
- lung capacity (LC).

For example, to take HBF, the Ruffier test, as adapted to Down syndrome children, is used. First, the HBF is determined in a state of rest (P1), and then right after the physical stress in the form of 15 squats (P2), and then 1 minute after the squats (P3). Based on the formula $\frac{(P1+P2+P3)-200}{10}$, the Ruffier index is calculated which must subsequently be correlated to the age specified in a special table.

5.5. The model of the experiment and its implementation

The model of the experiment is shown in Figure 1.

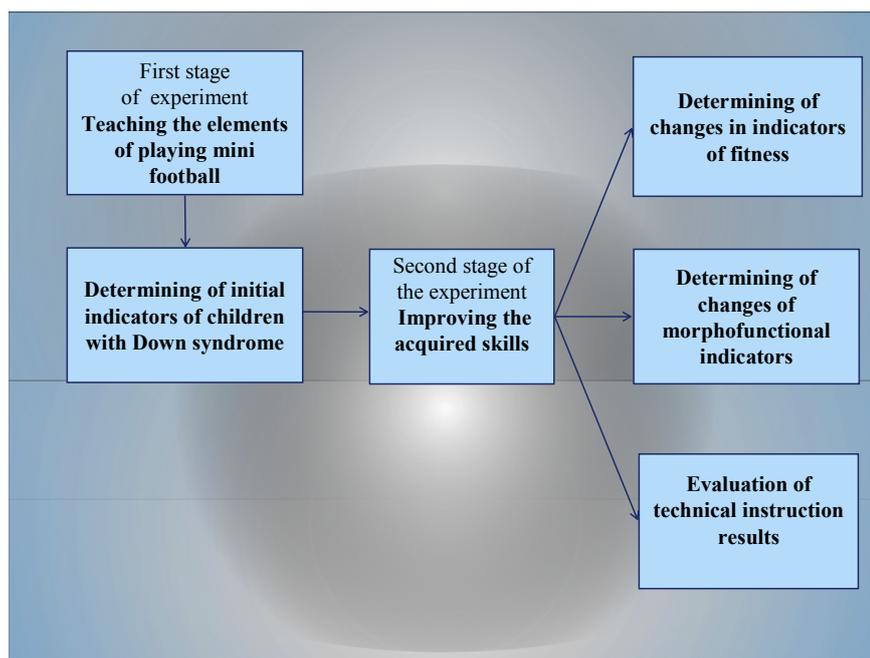


Figure 01. The model of the experiment on studying the impact of football on the development of children with Down syndrome.

The first training sessions were attended at various times by 4 to 12 children (boys with Down syndrome). Their age was 7 to 18 years old. Simple exercises were offered to them during the training. The plan and contents of the training session are shown in Table 1.

Table 01. Plan of a football training session for children with Down syndrome (first stage).

Contents	Dosage	Indications for the procedure
1. Explanation of the session task	4 minutes	
2. Walking (running) with the ball in the gym	10 minutes	Attempts not to lose the ball, concentration on the technique
3. Ball trapping, stopping and passing in pairs	10 minutes	Performance of correct ball stopping and passing
4. Goal attempts	15 minutes	Kicking by turns, trying to shoot on goal
5. A pass to the coach in the gym centre, then a dash for the goal, getting the ball back and kicking it.	15 minutes	Concentration on the technique of passing the ball and shooting on goal
6. The summing up of the training session	4 minutes	

At the second stage of the experiment that started in October 2016, a direct study was made of the impact of playing football on the development of children with Down syndrome, namely:

- an increase of memory capacity for learning new skills;
- improvement on concentration of attention;
- improvement on physical capabilities;
- improvement on morpho-functional indicators;
- improvement on technical skills in compliance with the developed model of the experiment;

The training session included:

- warming up by different general exercises;
- running with the ball in changing directions;
- passing the ball in pairs on the move with subsequent shooting on the goal.
- passing the ball in threes;
- playing “the square”.

6. Findings

At the first stage the following difficulties arose attributed to the specifics of children’s nosology, i.e. the loss of interest in studies; impaired concentration of attention; slow digestion of new movements.

The following methodical techniques were used for overcoming these difficulties, namely, encouragement and motivation of children all through the session; an individual approach to each child; due regard for the fact that children with Down syndrome need more repetitions, which is why the instruction must be divided into small stages.

The results of the first phase of the experiment can be formulated as follows.

The children have acquired the primary skills of controlling the ball needed for playing mini football, such as dribbling, a pass, ball trapping and control, goal attempts from different positions and game situations.

Intermediate results of the experiment were discussed at a seminar held by the Russian State Social University with participation of experts from Britain. With support of the FIFA's social program "Football for Hope" and the Social University, the specialists of the Down Syndrome Association's programme DSActive were invited to Moscow for participating in the seminar on the subject "Psychological and pedagogical specifics of work with the Down syndrome children in sport groups engaged in football", which seminar was organized by the Russian Charitable Foundation Downside Up (An incredible trip to Moscow for DSActive!, 2017).

The intermediate results testify to the positive dynamics of the results being analyzed.

6.1. Improvement of physical fitness

An adapted test for determining the speed performance of children with Down syndrome (a 10 meter race for time) revealed a positive dynamics, i.e. during the experiment the physical fitness improved.

6.2. Positive changes in morpho-functional indicators

The analysis of the charts obtained by myofasciography testifies to the fact that as a result of pursuing mini football, 83.3% of those embraced by the experiment have displayed an increased functional activity of the lower limb muscles innervated by the lumbosacral portion of the spinal column.

6.3. Improved technical skills in mini football

Analysis of the dynamics of intermediate indicators of testing the technical skills has shown that the relative ratio of the ball dribbling control increased by 4%, while the relative ratio of the pass precision improved by nearly 58%, relative ratio of trapping by 16% and relative ratio of hitting the goal by 80%.

6.4. Improvement of physical rehabilitation indicators

In carrying out an intermediate HBF test it was determined that 57.1% of the children being surveyed have a positive dynamics of the Ruffier index. It follows therefore that during the experiment the indicator of physical functionality had grown.

Overall, positive results are observed, conditioned by mental concentration of the trainees which, in turn, fosters the growth of repetitions of mechanical actions and, in some cases, the improvement on their quality.

Thus, in the framework of this experiment, we seek to build a comprehensive system of evaluating the physical fitness, changes of morpho-functional indicators and the results of technical instruction of children with Down syndrome. Also, we try to find out how the elements of playing football impact those indicators.

The investigation results are summed up in the Russian Social University graduates' qualification works. Also, practical recommendations are elaborated for using the approved methods of teaching in other regions of Russia.

7. Conclusion

The results of the experiment make it possible, we believe, to draw the following conclusions.

7.1. Physical rehabilitation

Acquiring the efficiency in preparatory sets of physical exercises for playing mini football is an essential stage on the way to physical rehabilitation and social adaptation of children with Down syndrome.

Children develop both physically and mentally. A reduced number of situations in which children are discontent with and angered by dedicated exercises, offered by coaches, are observed.

The experiments show an improved capacity to work, memorize and concentrate attention which, in turn, increases the number of repeated technical actions and, in some cases, improves their quality.

7.2. Social adaptation

A positive dynamics is observed in learning to act collectively and interact on the sports arena, which results in the reduced number of failed passes performed in twos and threes, and understanding of one's own role in the two-sided game.

The questionnaire-aided survey of parents of children with Down syndrome has confirmed the assumption of positive changes in children's behavior, their discipline in daily life, in helping their parents in household chores, relations in the team of contemporaries, and in studying the general education subjects.

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