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# Effect of the Physical Education and Sport Classes on the Physical Capacity of Children with Special Educational Needs

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## Abstract

In this study was to determine the impact of physical education and sports lesson on the physical capacity of children with special eğitime needs and on this basis to outline the main directions for of educational process in secondary schools. Totally, 67 students region Kars in the of Turkey from 22 secondary education school participated in this study. They divided into groups according to their gender and health status; children with normal physical and mental development (24 boys, 18 girls; control group) and children with special education needs (15 boys, 10 girls; experimental group). Children's height, weight and Body Mass Index (BMI) were used a standard methodology, a manual dynamometer to measure the strength of the upper limb and a test battery to determine their physical capacity. Regarding inclusive education, questionnaires were collected from physical education teachers. Results were compared with the total sample and between the two target groups. According to the findings of the research, when the change in physical capacity characteristics of boys and girls with and without special education needs is examined; Sprint 20 m, Hand Dynamometer - appropriate upper limb, Dynamometry - Inappropriate upper limb, Throwing a thick ball, Jumping to length, Crunches, 400 m running, Depth of inclination, after the experiment; although it has different effects on the physical capacities of children with cognitive, hearing and vision problems, it has not statistically significant compared to the groups In order to develop the physical capacity of children with special educational needs, physical education and sports lesson activities should be increased, and new models should be developed. Limitations, suggestions for future research and implications for practice are discussed.

**Keywords:** Physical Education, Physical Capacity, Children, Special Educational, Disability

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## Introduction

Physical activity (PA) is a fundamental component of overall well being and most children's experience of this is through Physical Education (PE) classes in school (Cheung, 2019; O'Connor and McNabb, 2020; Ross et al., 2016). The universal popularity of sport makes it an ideal transformative tool for fostering participation through equal access to activities, inside and outside the school system (UN, 2006). Yet, research shows that young people with special educational needsand (SEN) disabilities in mainstream schools continue to experience fewer participatory sporting options than their pers. Students with disabilities have more time to spend with their peers , which also has positive effects on the regular students as they gain some ideas regarding these people, who are an inseparable part of society (Bavlı et al., 2020; Demirci et al., 2018; WHO, 2018; McCoy et al., 2016; Adair et al., 2015). Health-related issues, adapted physical activity, social rehabilitation and integration of people with disabilities are becoming more and more relevant and engage an increasing contingent of people (WHO, 2017; Bertills et al., 2019).

Inclusive education is based on the fundamental right of all learners to quality education that meets their basic learning needs, encourages their personal development to the fullest extent, and considers the diversity of backgrounds and abilities to be a learning opportunity rather than a barrier (Ainscow and Miles, 2008; ). Physical education and sports lesson; It is an integral and indispensable part of general education for children who need special education. The same time; It is an ideal area where cooperation, appropriate competition, personal and social responsibility are taught, games and physical activities are to gain active and healthy life skills (Mamak et al., 2020; Viciana et al., 2019; Toptaş Demirci et al., 2014). Disabilities and long-term health conditions may limit meaningful participation in mainstream PE, unless proper support is provided. Applying a nondisabled perspective such as using able-bodied or ableism to describe skills required in PE, may undermine and disrespect the value of disabled identity (Giese and Ruin 2018; Hart and Drummond, 2014; Loja et al., 2013).

The structure of PE lessons, both in terms of physical and social adaptations, is important for the participation of SEN in school-based PE (Toptaş demirci and Demirci, 2018). Different adaptations and modifications are required, depending on the type of disability. Meaningful learning experiences for students with disabilities in PE are extensively dependent on teachers' skills to and attitudes toward communicating and structuring their teaching in an inclusive direction (Nevilleet al., 2020). Participation restriction may be experienced if the activity is not adapted to students in need of special support (Coates and Vickerman, 2010; Haegele et al., 2017). Students with physical disabilities describe good days in PE as lessons in which they experience a sense of belonging, their participation as skillful and where you share benefits. Encouragement, reinforcement, help and guidance facilitate positive peer interaction. Patience and social encouragement are examples of

caring support. Above all, several studies conclude that sharing PE sessions with a student with disability creates positive attitudes towards inclusion of students with disabilities (Liu et al., 2010; McKay et al., 2015; Sullivan and Glidden, 2014). However, while PE fosters the acceptance of students with disabilities it is also observed that there are barriers and facilitators to inclusion (Darretxe et al., 2016; Haegele et al., 2017).

International research shows that children with special educational needs (SEN) are still not accessing or being fully included into educational programs within mainstream schools (Neville et al., 2020). This problem of inclusion is particularly acute when it comes to SEN children accessing high-quality physical education (PE), and the research evidence shows the signs of a double-bind here: SEN children are disproportionately affected by social-emotional, behavioral, health conditions related to physical inactivity, and exclusion from PE (Bloemen et al., 2015); PE teachers, however, often lack the knowledge, confidence, or pedagogical training to adapt their lessons in ways that would suitably include them (Rekaa et al., 2018).

There is a longstanding recognition within PE of the challenges associated with including children who vary in physical ability and learning preference (Makopoulou and Thomas, 2016). Policy statements and empirical studies on the attitudes of teachers and on the suitability of teacher education for inclusion have really only emerged over the last ten to fifteen years, however (Rekaa et al., 2018). Among the more pressing challenges in light of international consensus on the need for curricular reform to promote inclusion is the design of interventions which can expand the scope and quality of initial teacher training (ITT). The basis for this commitment, to inclusive pedagogy as a foundation for effective teaching and learning, is found within the Salamanca Statement, which states “pre-service training programs should provide to all student teachers, primary and secondary alike, positive orientation toward disability, thereby developing an understanding of what can be achieved in schools with locally available support services” (UN, 1994).

Physical education programs for children with SEN need to be prepared based on their requirements and individual characteristics such as diagnosis, severity of diagnosis and existing performance level (Hutzler, 2003; Ozer and Sahin, 2010). It is known that physical education helps children with SEN to develop self-concept and social competence, develop motor skills, physical and motor adaptation, leisure time skills, playing and creative time skills as long-term objectives. Physical education for children with SEN are required to be competent in terms of improving psychomotor, sensory and cognitive development. If these developmental domains are achieved, these long-terms objectives will be achieved as well. Nevertheless, physical group activities promote sharing, communication and learning social behaviors among individuals with special needs (Konar and Yildiran, 2012; Ozer and Sungu, 2016; Demirci and Toptaş Demirci, 2016). Teachers' knowledge of adapted training and their ability to apply adapted methods and tools is a guarantee for successful

socialization of children with various deficits and enabling these children to cope with the requirements of the curricula of the different disciplines. Special attention should be paid to adapted physical education and sports classes. In their totality, they provide children with the opportunity to increase their physical development, improve their physical capacity and develop valuable skills that will be needed both in their training and in their next years of life.

**Research Questions**

This research aims to identify the impact of physical education and sports on the physical capacity of children with special education needs and to outline the main directions for the learning process in secondary schools.

1.What are the opinions of PE-teachers' about inclusive education?

2. Is there a difference between the physical fitness of the students who need and do not need special education between the ages of 11-14?

3. Conducting a sports and pedagogical experiment to determine the effect of physical education and sports lesson in secondary education on the physical capacity of children with and without special education needs.

4. Comparative analysis of physical capacity in children without and with special educational needs

5. Characteristics of physical capacity in children with different specific deficits

6. Evaluation of the effectiveness of physical education and sports training at the end of the experiment period for boys and girls with and without special education needs.

## Method

**Research Design and Participants**

Totally, 67 students region Kars in the of Turkey from 22 secondary education school participated in this study. They divided into groups according to their gender and health status; children with normal physical and mental development (24 boys, 18 girls; control group) and children with special education needs (15 boys, 10 girls; experimental group). Children with special needs are taught along with children without health problems in the form of so-called inclusive education. All procedures were in accordance to the Helsinki Declaration regarding Human research. Informed consent to participate was collected from of (67) students, and (99) their teacher. Ethical approval was obtained from the research committee of the research university. The group of students with special educational needs were diagnosed with hearing impairment, visual (sensory) impairment, movement

impairmen or cognitive impairment a combination of one or more disabilities. A detailed feature of the disability of these children is presented in Table 1.

**Table 1.** A Detailed Feature of The Disability of These Children Is Presented

| Feature of the disability of children | Gender | N | Age Range | Impairment | Level of Impairment |
|---|---|---|---|---|---|
| Hearing impairment | Female | 2 | 12 | | Moderate (41-55Db) - Moderate Heavy (56-70 Db) |
| | Male | 4 | 13-14 | | Moderate (41-55 Db) - Deep (<90 Db) |
| Visual impairment | Female | 3 | 12 | | %50- %70 |
| | Male | 5 | 12-14 | | %50- %90 |
| Movement impairment | Female | 1 | 11 | Amelia | Upper left limb |
| | Male | 1 | 13 | Fokomelia | Upper left limb (up to elbow) |
| Cognitive impairment | Female | 4 | 11-13 | Dyslexia - ADHD - NLD Dyspraxia | Mixed - Combined type - Motor |
| | Male | 5 | 11-13 | Dyslexia - ADHD | Dysphonemic - Mixed - Hyperactive-impulse type |

Attention Deficit Hyperactivity Disorder (ADHD) , Nonverbal learning disorder (NLD)

**Data Collection**

The height, weight and Body Mass Index (BMI) of children a standard methodology and for measuring the strength of upper limbsa a manual dynamometer was used. Test battery were used to determine the physical capacities of children. Regarding inclusive education, questionnaires from physical education teachers (n = 99) were collected.

**Teacher Questionnaires**

A questionnaire developed by a researcher about Curriculum, Problems of Teaching, Material, Attitude of The School Management, Inclusive Education, Pedagogical Staff (teacher training) was conducted with the teachers who participated in the survey. The questionnaire includes 55 questions. The selection, content and ordering of the questions within it is consistent with the purpose and objectives of the study. The questions are answered by a 5-step scale of the likert type, where 1 is "always" and 5 - "never". Questions 1, 34, 42, 47, 48 and 49 are reversed (the rating scale is reversed) (Table 2). Expert opinions were consulted to ensure the appearance and content validity for the draft, the necessary corrections were made and the survey was finalized. The validity and reliability analyzes of the data collection tool were made; Internal consistency coefficient (Cronbach Alpha Coefficient) was calculated as $\alpha = 0.86$.

**Table 2.** The Scale of Assessment of Pe-Teachers' Opinions About İnclusive Education

| Index | N | Items |
|---|---|---|
| Curriculum | 10 | Content and the expected results from the implementation of the curriculum on which the teachers of physical education in the secondary schools are currently working. |
| Problems of Teaching | 16 | Teacher's their professional qualifications on issues related to working with disabled children. |
| Material and Technical Provision | 4 | Problems related to the material and technical provision of the physical education and sports education |
| Attitude of The School Management | 8 | Attitude of the school management to the problems of the physical education and sport education of the children with special education needs |
| Inclusive Education | 11 | Issues related to inclusive education in physical education and sports |
| Pedagogical Staff | 6 | Problems related to the development of pedagogical of staff |

**Anthropometry**

For measuring the height and weight of children (indicators 1 and 2 - Table 3). A standard methodology is applied (Sunny, P. et al., 1998). the so-called " Body Mass Index (BMI), BMI = Weight (kg) / Height (m)².

**Dynamometer**

For measuring the strength of upper limbs (both comfortable and inconvenient) indicators 5 and 6 (Table 3). A manual dynamometer was used. A standard methodology is applied.

**Sports-Pedagogical Testing**

To check the effectiveness of the training and inclusive education, physical education and sports in elementary school. The participants in the experimental (children with special needs) and the control (children without health changes) groups were given a sports-pedagogical test (twice) of 6 physical fitness tests, adequate for the studied age group (11-14 years old) - indicators 4 and from 7 to 11 (Table 3).

**Table 3.** A List of The Physical Development and Physical Disability İncluded in The Test Battery Used

| No | Indicators | Measuring Units | Accuracy Of Measurement | Growth Direction |
|---|---|---|---|---|
| 1 | Growth | cm | 1,0 | + |
| 2 | Weight | kg | 0,1 | + |
| 3 | Body Mass Index (BMI) | kg / m2 | 0,01 | +- |
| 4 | Sprint 20 m | s | 0,01 | - |
| 5 | Hand Dynamometer - convenient upper limb | kg | 0,1 | + |
| 6 | Dynamometry - Inconvenient upper limb | kg | 0,1 | + |
| 7 | Throwing a thick ball | m | 0,05 | + |
| 8 | Jumping to length | cm | 1,0 | + |
| 9 | Crunches | number | 1,0 | + |
| 10 | Running 400 m | s | 0,01 | - |
| 11 | Depth of inclination | cm | 1,0 | + |

**Description of Physical Disability Indicators**

**Test 4. Sprint 20 m**: From starting position, a high start is run at a maximum speed of 20 m. It goes after a whistle signal. Each participant ran the distance twice. The better achievement is reported, with an accuracy of 0.01 s.

**Test 7. Throwing a thick ball**: Standing - Starting from a standing position, throwing a thick ball with two hands over the head. Measure the distance from the starting line to the point where the ball touches the floor at the drop, accurate to 0.05 m. Two attempts are made. Better achievement is reported.

**Test 8. Jumping to length**: From the starting position, stand with your hands forward (the feet are slightly loosely aligned) with a squeeze combined with a hand retraction from down to the back, followed by a backlash with the arms and a two-leg rebound, with a stride landing as far as possible. The distance from the starting line to the last mark left by the jumper's feet is read, to the nearest 1.0 cm. Two attempts are made, respecting the better achievement.

**Test 9. Abdominal presses:** Starting position with a knee bent at an angle of 90 °. The arms are folded in the elbow joints, with the elbows being taken away and the palms on the back. It works in pairs. The partner is squatting and for stability holds the feet in the ankles. Retract and tilt forward with the forehead to touch the knees. Between the chin and the chest all the time should be one fist away. Count the correctly executed abdominal presses for 30 seconds.

**Test 10. Running 400 m**: From a starting position, a high start, after a signal, runs a distance of 400 m. The running time of the five series is counted, accurate to 0.01 s.

**Test 11. Depth of the inclination**: Starting position seating with hands forward, knees tightened. The soles folded into the ankle joints at right angles are resting against the broad part of a Swedish chair lying down. It is tilted forward, with the fingers aiming to touch the stool and pass as far as possible from the toes. The end position lasts for about 3 seconds. The depth of inclination is accurately measured to 1.0 cm on a special scale scaled (1 cm) in both directions (positive - from 100 cm upwards when the fingers pass from the far side of the feet and negative - 100 cm down when the fingers do not reach the bench).

**Sports and Pedagogical Experiment**

To verify the effectiveness of the current teaching methodology for physical education and sports training in the secondary schools of Turkey and its impact on the physical capacity of children with special needs. During the experiment, our role as a pedagogue was related to provoking children to participate actively in the classroom, adapting the assignments according to their physical and mental abilities.

**Adaptation of the activities for children with hearing impairments was ensured by:** creating routine habits for the classes, building a communication strategy in class, combining verbal and nonverbal signs to explain exercises and assignments, which is introduced and applied by the pedagogue but is also used by all children (with and without disabilities); maintaining during the exercises of continuous eye contact with children with problems; use in explaining appropriate graphical images; the predominant use of the demonstration method.

**Adaptation of the activities for children with visual impairments was ensured by:** providing an adequate amount of light in the salon; the use of a separate part of the school salon so that the visually impaired pupil can become familiar with and become more accustomed to the environment; continuous maintenance of verbal contact; slow and clear instruction from the educator, detailed description of the exercise, understandable explanation of the movements and execution of the same in parts (eg if the instruction requires a left hand lift, use the touch of the left hand of the child).

**When working with children with motor problems** the lessons were adapted according to the possibilities of the particular students. The goal was that, when performing the exercises, the respective pupils could be presented with equal or even better results than their classmates. The tasks we set up required the use of coarse rather than fine moves.

**Adaptation of activities for children with cognitive problems** is extremely difficult. Therefore, the adaptation of tasks in this case consisted in placing the assignments in parts (the movements were disassembled for the purposes of learning and subsequently merged), involving more coordination exercises and exercises that improved the equilibrium of the students.

**Statistical Analysis**

Alternative analysis - to determine the relative percentages (in%) of the growth rates of the observed signs in each of the test populations for the time of the experiment. Significant increases in adherence are assumed, where the percentage difference is higher than 10-11%.

Variation analysis - to reveal the mean levels and variability of each of the tested signs in each of the groups involved in the experiment both at the beginning and at the end of the sport-pedagogical experiment. In determining the homogeneity of the observed sets, the rules of the sports statistics were adopted, according to which, at values of the coefficient of variation V: lower than 10% - the relevant indicator is stable and the population surveyed is homogeneous in relation to the attribute for which this indicator carries information; between 10% and 30% - the indicator is relatively stable and the population surveyed is relatively homogeneous; over 30% - the indicator is unstable and the surveyed population is inhomogeneous.

Hypothesis check (using Student's comparative t-criterion) to prove or reject the zero hypothesis about the significance of the differences between the mean levels of the studied sets. T-criterion values for dependent (baseline and final data for the same population) and independent (experimental and control groups as well as boys-girls) samples were calculated. Critical values tat (ttabl) for both dependent and independent samples, with a high level of confidence (Pt ≥ 95%), are determined by a special table (Broglie et al., 1990 ).

Method of sigma deviations - for quantification of the status of the measured signs. Based on the average levels for the whole study population, the T scores of each of the experimental subgroups formed by children with different specific deficits (auditory, visual, cognitive) were calculated for the boys and girls. The (Tsarova, R., 2013) assessments are normalized, we are presented in a 50-point point system, which allows us to compare the achievements of differently measured tests and indicators (measured in s, cm, kg, number, etc.). The following formula is used: Tij = 10 . Zij + 25

As can be seen, the T score is actually a transformed Z-score, which in turn is obtained by centering the median achievement (Hij) of each of the special groups studied, on the average score of the corresponding test j for the whole set (Xj) and normalizing the difference obtained (Hij - Hj), regarding the standard deviation of the whole set (Sj), ie.

$$Zij = \frac{Xij - Xj}{Sj}$$

The average level of the whole set corresponds to 25 points.

In cases where a lower result score for a given test corresponds to a higher quality (for example, a run time), the evaluation scale is reversed. In this case, estimates of 2 of the surveyed indicators (4th and 10th, respectively, "sprint 20m" and "running 400m") were calculated in this way. Cronbach alpha coefficient - to determine the weight of the responses received to the questions from the survey conducted. The critical value of $\alpha = 0.86$.

## Results

### PE-Teachers' Opinions about Inclusive Education

The results of the study showed that the vast majority of teachers surveyed were not open enough to work with children with disabilities in the physical education and sports curriculum. It was determined that the professional qualifications of teachers should be improved and the materials used in the lessons were insufficient. While the school management supports inclusive education; Most teachers are not subjected to in-service training. Given the problems associated with the pedagogical

development of staff, it was determined that university education was not sufficient to prepare them to work with children with disabilities.

**Average values and variance of signs of physical disability at the beginning of the sport-pedagogical experiment:**

**Values of obesity rates of boys and girls without and with special educational needs between the ages of 11-14**

Appear to have normal body weight (%62,50) of the male group who did not need special education at the beginning of the observed period (BMI: 19.40 kg / m2). It is seen that 12.50% of healthy boys are weak and 25% are overweight (Fig. 1-A). while in the group of children with special needs, the relative share of the children in this area is only 6.67% (Fig. 1-B).

The same is true of weight, but both are in the normal body area (BMI is 19.92 kg / m2 in girls and 19.40 kg / m2 in boys respectively). The analysis in Fig. 1-C shows that at the beginning of the experimental period, the proportion of girls with normal body weight was 83.33%, while 16.67% are overweight (Fig. 1-C). The analysis in Fig. 1-D shows that 80% of the children girls who need special education in this population have normal body weight but the remaining 20% are overweight.

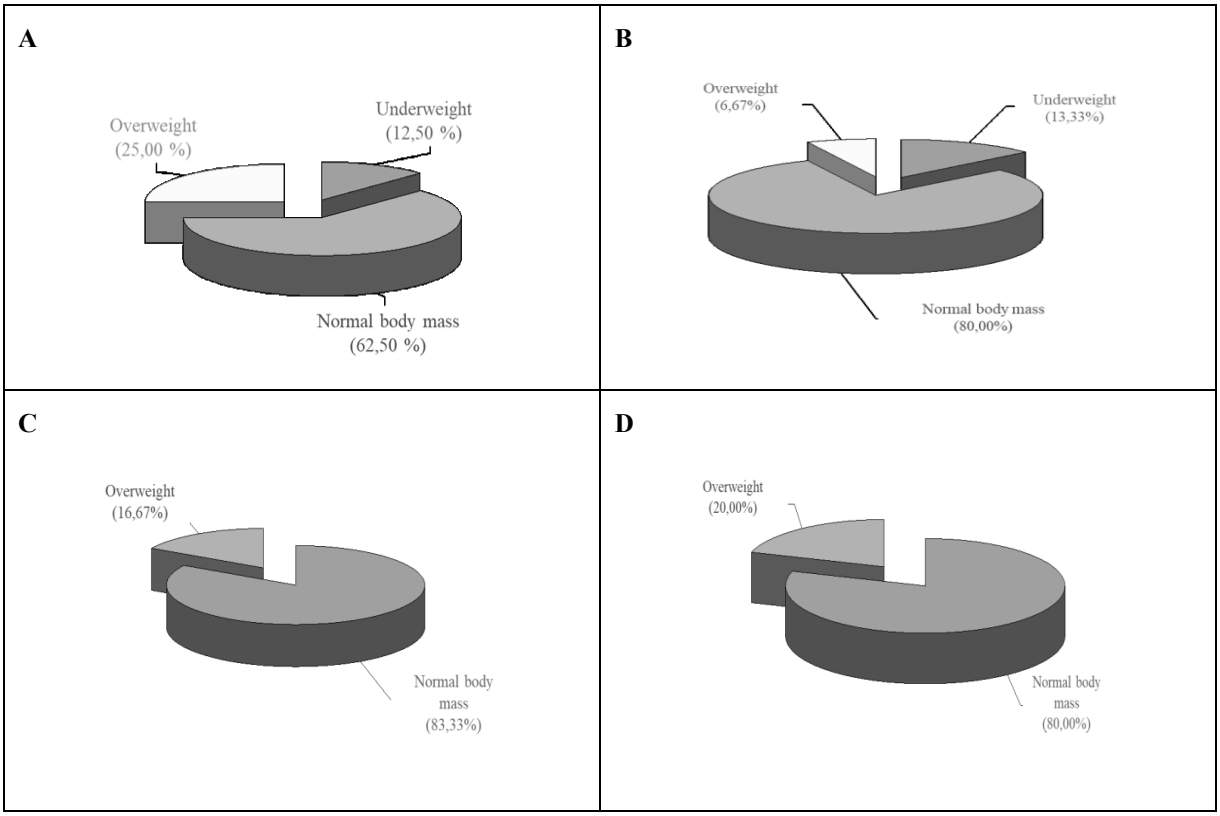



**Fig 1.** Relative values of obesity rates of boys and girls without and with special educational needs at the beginning of the experimental period. (Fig. 1-A: boys without special educational needs; Fig. 1-B:

boys with special educational needs; Fig. 1-C: girls without special educational needs; Fig. 1-D: girls with special educational needs).

**Change in physical capacity characteristics of boys and girls without and with special educational needs between the ages of 11-14**

The analysis of Fig. 2-A shows that; the height of the boys is between 139.60 cm (X1min) and 162.80 cm (Xmax), the weight is between 32.60 kg (X2min) and 56.40 kg (X2mAh) This naturally reflects on the coefficient of variation V. The figure shows that; the V values are between 4.34% and 20.50%. The lowest (below 10%) is the coefficients of variation at indicators 1, 8 and 11 (corresponding to 4.34%, 6.51% and 6.06%). For the other indicators, V values ranged from 12.49% (for index 3 - body mass index) and 20.50% (for indicator 9 - abdominal presses).

Fig. 2-B shows that; boys with special educational needs; p the height of the boys included (V1 = 5.07%); spine flexibility (V11 = 5.33%); the degree of body protection (V3 = 9,15%), and the level of explosive force development of the lower limbs in muscular effort in the horizontal plane (V8 = 9.77%). Relative homogeneity is observed with respect to: static force of the comfortable upper limb (V5 = 12.60%); body weight (V2 = 13.12%); boys' sprint capabilities (V4 = 16.20%); speed endurance (V10 = 25.92%); the explosive force of the abdominal musculature (V9 = 29.19%). At the same time, as shown in Fig. 2-B, 6th and 7th indices, respectively, "manual inconvenient upper limb dynamometry" and "ball-throw" respectively, coefficients of variation are higher than 30%.

Fig. 2-C as it can be seen, girls without special educational needs; the values of the coefficient of variation are in the range of 10 to 30%, this is a proof of the relative homogeneity. Here too, the studied population is homogeneous in terms of body length (index 1 "height", V1 = 4.43%), flexibility (index 11 "depth of inclination", V11 = 4.70%) and explosive force of the lower limbs in muscular effort in the horizontal plane (indicator 8 "leap length", V8 = 5,10%).

The examination of the variability of the studied signs of physical capacity (Fig. 2-D) shows that; at the beginning of the experimental period the group of girls with special needs was homogeneous in terms of the growth and flexibility of the children included in it (V1 = 3,39% and V11 = 4.75%). Unhomogeneity is observed with respect to the level of development of both the upper limb explosive force (index 7, V7 = 39.81%) and the static force of the awkward upper limb (indicator 6, V6 = 37.69%).

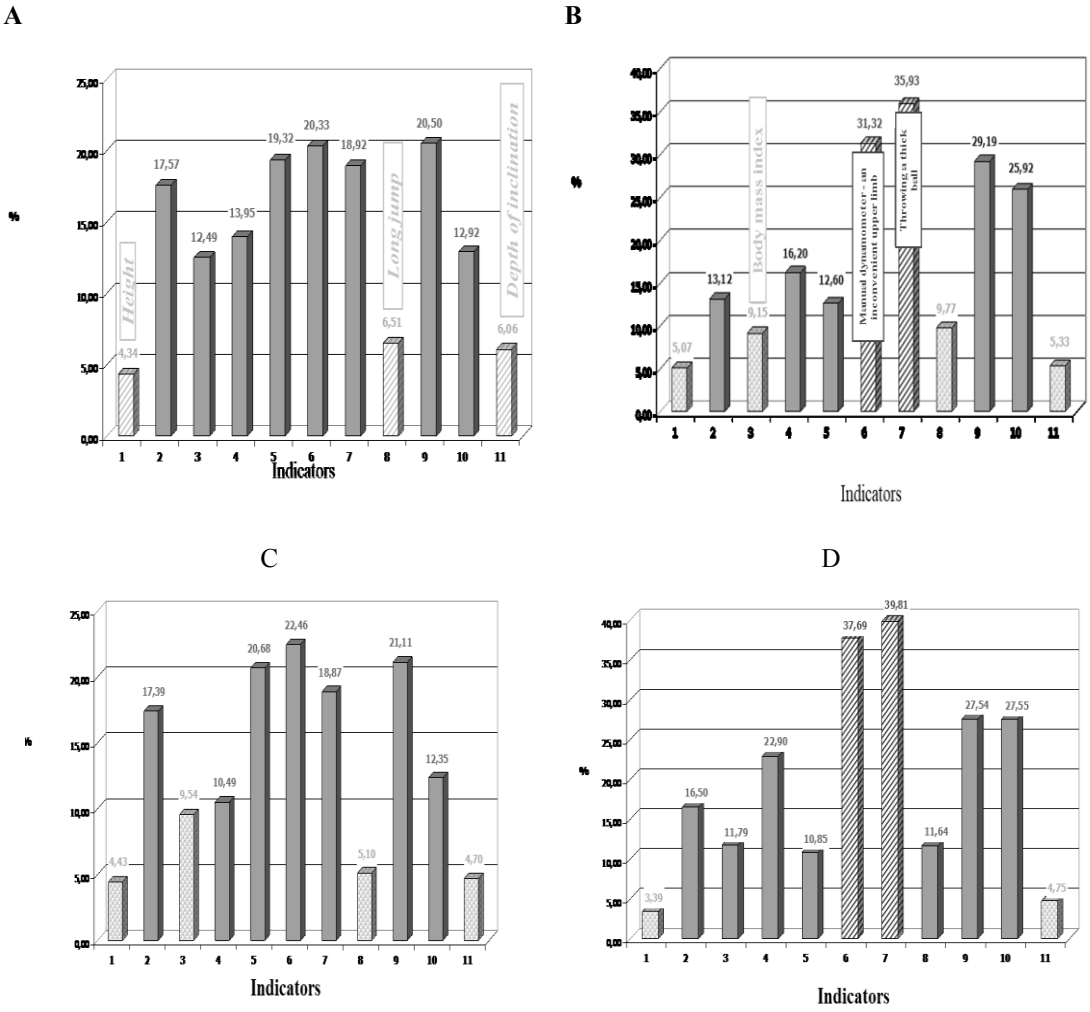



**Fig 2**. Fig 2. Average values and change in physical capacity characteristics of boys and girls without and with special educational needs at the beginning of the experimental period. (Fig. 2-A: boys without special educational needs; Fig. 2-B: boys with special educational needs; Fig. 2-C: girls without special educational needs; Fig. 2-D: girls with special educational needs).

## Comparative analysis of the signs of physical capacity in children without and with special educational needs

The analysis made so far has shown that there are some differences between the average levels of physical fitness in the groups of boys and girls without and with special needs. The analysis of the shows that the group of boys with special needs has a lower level of development of all indicators of physical capacity, but not in terms of anthropometric signs (Fig. 3-A boys). The comparative analysis of girls' results (Fig. 3-B girls) also shows that there are larger or smaller differences between the mean levels of the physical signs studied, but unlike the boys, healthy girls here have all the advantages.

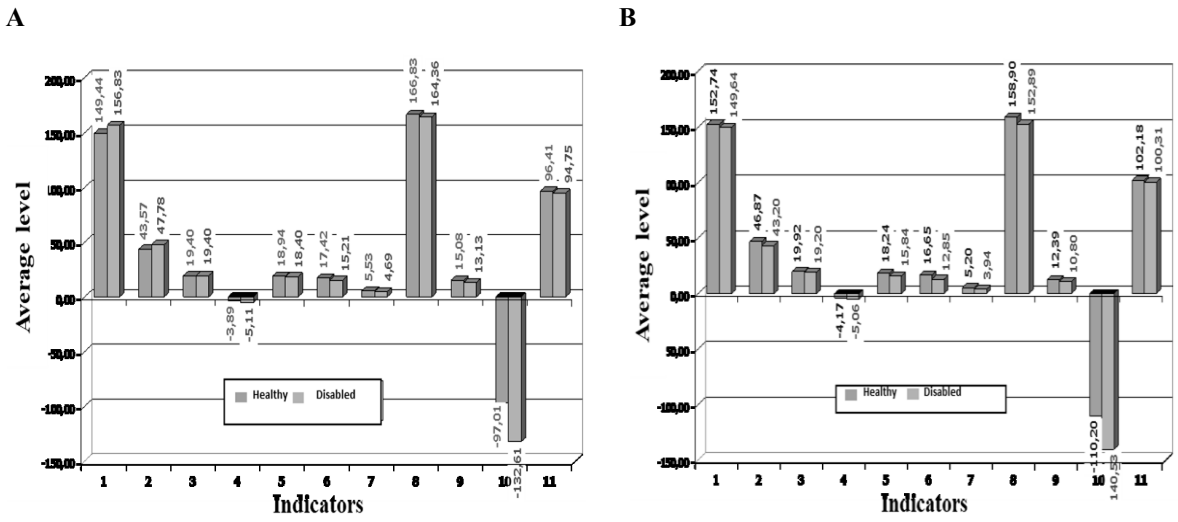



**Fig 3.** Comparative analysis of average levels of physical capacity signs at the beginning of the experimental period (Fig. 3-A boys; Fig. 3-B girls).

It can be seen that; the t-criterion values for the majority of the observed signs are lower than the critical value (ttabl = 2.02). This gives reason to believe that the advantage of healthy boys in terms of indicators 3, 5, 6, 7, 8, 9 and 11 is insignificant and can be explained by accidental causes. Speed and sprint abilities (indicator 4, t4 = 5.56) and speed endurance (indicator 10, t10 = 4.64). At the same time, the group of boys with special needs has a significantly low growth rate (indicator 1, t1 = 3.17) (Fig. 4-A).

Fig. 4-B (girls) shows that; in 7 of the studied features the advantage of the first group is insignificant. Proof of this is t-criterion values that are lower than the critical (ttabl = 2.07) and move between 0.88 and 1.85. The same can not be said for indicators 4, 6, 7 and 10. Also, the static force of the awkward upper limb (t6 = 2,29); Explosive force of upper limbs (t7 = 2.57); the speed of the girls (t4 = 2,95), and speed-strength endurance (t10 = 3.02).

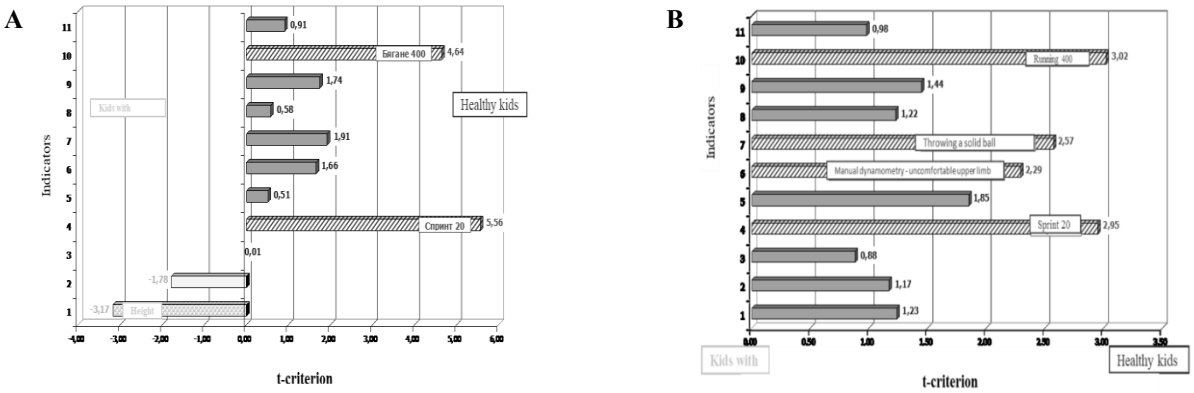



**Fig 4.** Significances of diferences between the average levels of the investigated signs at the beginning of the experimental period (Fig. 4-A boys; Fig. 4-B girls).

**Characteristics of physical capacity in children with different specific deficits**

The analysis in Fig. 5-A shows that; boys with visual impairments have better developed sprint capabilities and are slightly more flexible. However, for indicator 1, the value of t is 0.63, which gives reason for the boys' height to be assumed to be a true zero hypothesis. The Fig. 5-A also shows that; as already noted, boys with hearing problems have the advantage of six of the physical signs. However, the values of the comparative criterion give reason to believe that their advantage is insignificant in terms of: the static force of the upper limbs (both comfortable and inconvenient - t5 = 0.46 and t6 = 0.36); the explosive force of the lower limbs in muscular effort in the horizontal plane (t8 = 0.78); speed endurance (t10 = 1.00), and the explosive force of the abdominal muscles (t9 = 1.33).

The comparative analysis of boys with cognitive and hearing problems (Fig. 5-B) shows that; the boys of the first set have higher developed: mobility of the spine (indicator 11, t11 = 2.05); explosive force of the abdominal musculature (index 9, t9 = 1.26); sprint options (metric 4, t4 = 0.89); speed endurance (indicator 10, t10 = 0.46); higher index of security (indicator 3, t3 = 1.20). But, as can be seen from (Fig. 5-B), for the other studied features is to the benefit of boys with hearing impairment. Observed advantage is significant only in relation to: the explosive force of the upper limbs (index 7, t7 = 6,20) and static force of the upper limbs (indicators 5 and 6, t5 = 3,72 and t6 = 3,31).

The comparative analysis of the boys with cognitive and visual problems (Fig. 5-C) shows that; here both groups have the advantage of half of the tested signs and weaker results on the other half. The advantage of children with cognitive problems refers to the aforementioned explosive force of the abdominal muscles, the speed of stamina and the mobility of the vertebral column, which they are superior to the group of boys with hearing impairment. Additionally, here, instead of speed and degree of protection, there is an advantage over the blast strength of the upper limbs (index 7, t7 = 1,14) and the explosive force of the lower limbs in muscular effort in the horizontal plane (indicator 8, t8 = 0.82). As can be seen from (Fig. 5-C), however, the only driving quality that boys with cognitive problems are significant compared to boys with visual problems is the blast of abdominal muscles. For the remaining indicators, there is a group of boys with visual problems, but with a high probability of assurance, it can be argued that this advantage is significant only in terms of the physical development: height (indicator 1, t1 = 2.32); weight (index 2, t2 = 3,15) and BMI index, t3 = 2.50).

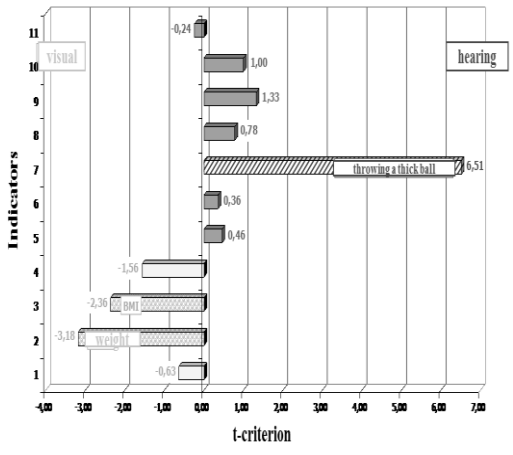
However, t-criterion values are not large enough, which means that the advantage of visually impaired girls with respect to physical development indicators is insignificant. Similar dependence is also observed with respect to indicators 4 and 5, 20 m sprint and "hand-held dynamometer -

convenient upper limb", which gives reason. For the other 6 indicators characterizing the physical capacity, the average results obtained in the first test of the girls with hearing problems are higher than those of the girls with visual problems. The more detailed analysis of Fig. 5-D shows that; the advantage of girls with hearing problems is significant only in terms of: burst force of abdominal muscles (index 9, t9 = 4.50); the spine flexibility (Indicator 11, t11 = 3,39) and the explosive force of the upper limbs in forward and upward muscular effort (indicator 7, t7 = 3.26).

Fig.5-E analysis shows that; this group also outperforms the group of girls with hearing problems in terms of physical development (indicators 1, 2 and 3), as well as their speed and sprint capabilities (indicator 4). Fig.5-E the analysis of the figure also shows that at the beginning of the experiment, girls with cognitive problems have higher levels than those with hearing problems, a level of development of speed endurance (indicator 10, t10 = 0.98), but this advantage is insignificant . In the other studies of physical fitness, the mean values are in favor of hearing impaired children, but the t-criterion values are in the range of 0.40 to 1.73, it is. the differences are insignificant.

The latter comparison between the groups of girls with visual and cognitive deficits (Fig. 5-F) shows that; in general the girls in the first group, for obvious reasons, have a lower level than the girls with cognitive impairment. The advantage of the last of 6 of the investigated signs is insignificant (t <2.57). However, with high warranty probability, girls with cognitive impairment can be said to besignificantly superior to those with visual problems only with respect to the explosive force of abdominal muscles (index 9, t9 = 4.93) and speed endurance (indicator 10, t10 = 3,15).

**A**

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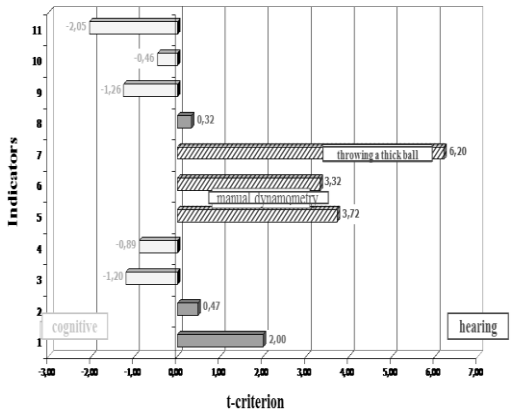

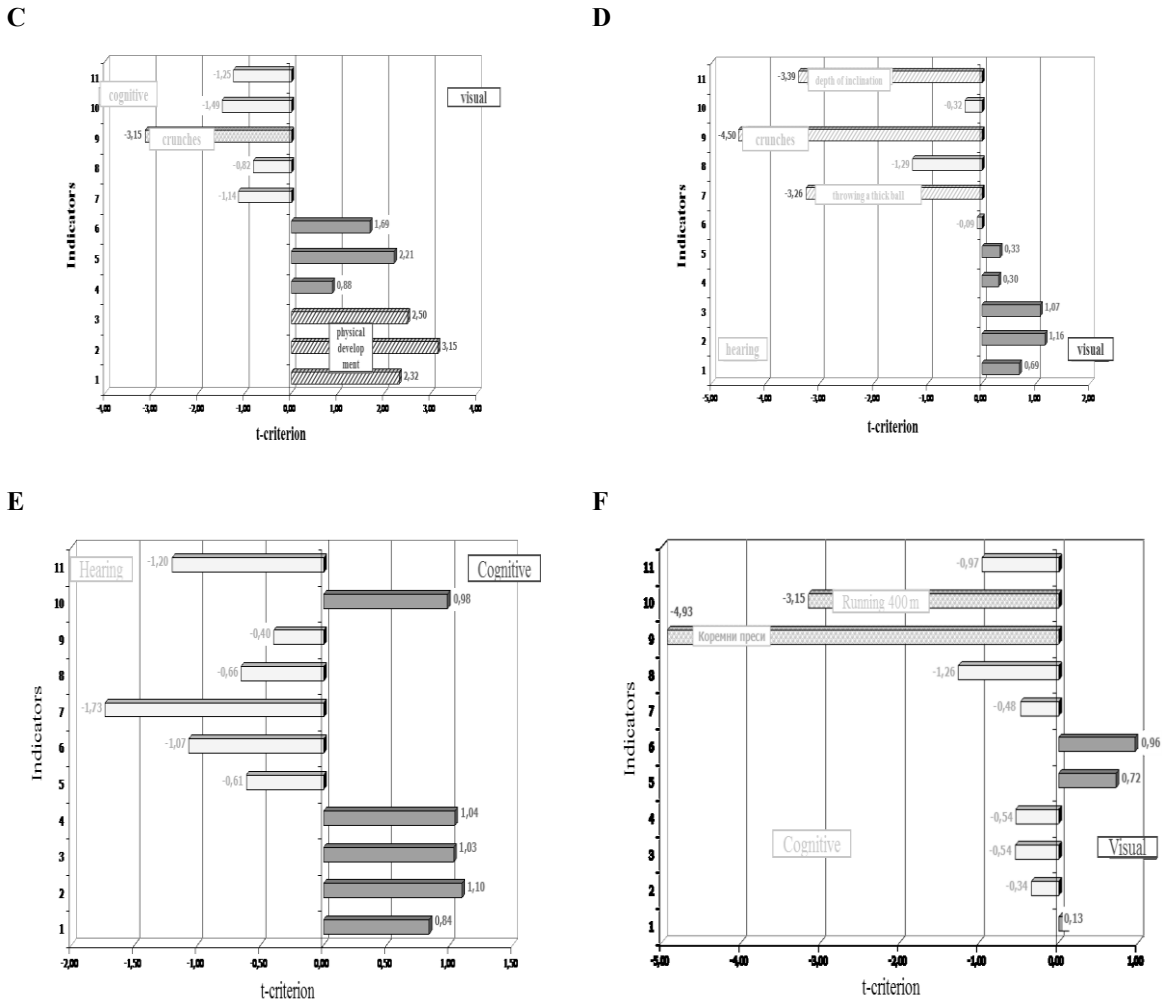


**Fig 5.** Significance of difference in average levels of physical capacity in boys and girls with health problem at the beginning of the experimental period. (Fig. 5-A: boys with hearing and visual impairments; Fig. 5-B: boys with hearing and cognitive impairments; Fig. 5-C: boys with visual and cognitive impairments; Fig. 5-D: girls with hearing and visual impairments; Fig. 5-E: girls with hearing and cognitive impairments; Fig. 5-F: girls with visual and cognitive impairments).

**Evaluation of the effectiveness of physical education and sports training at the end of the experiment period for boys and girls with and without special education needs**

As stated in the Methodology of the study, in order to establish the effect of physical education and sports training, at the end of the observed period a new sports and pedagogical testing was carried out for all students included in the groups. Testing was performed only on the basis of physical fitness (indicators 4 to 11). Physical development data (indices 1 to 3) were not taken into account due to the fact that for the limited time of the experiment significant changes in the growth and weight of children in the age group studied can not be expected.

At the end of the experimental period, boys without health problems increased their achievements in all observed signs of physical capacity. For example, they improved the sprint distance (indicator 4) by 0.24s, threw the dense ball on average by 72cm farther, made an average of 2 abdominal presses more than before, and so on. It can be seen that the highest increase was observed in indicators 7 and 9 (respectively "ball-throw" and "abdominal presses"). at the end of the sports-pedagogical experiment under the influence of the means of physical education and sport, have significantly improved their own: explosive force of the upper limbs, in muscular effort up and down, 13.04%, and explosive force of the abdominal musculature - by 12.71%. However, in the other studies of physical fitness, the increases are in the order of 1 to 6% (Fig. 6-A). Fig. 6-B shows that at the end of the experimental period the girls participating in the survey ran 20 m sprint on average for 4.06 s, cast the dense ball on average at 5.43 m, averaged 14, 28 abdominal presses, and so on. The analysis shows that the final results for all indicators are positive, that the relative shares of the growth rate are generally lower than 8.50% (Fig. 6-B).

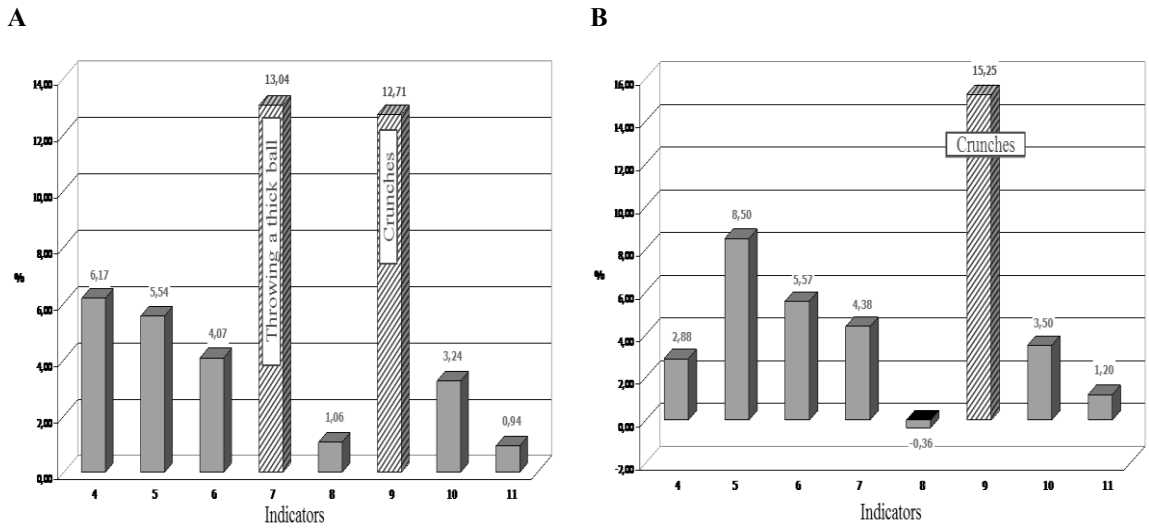


**Fig 6.** Relative percentage (in%) of changes of physical capacity in boys and girls without health problems at the end of the experimental period (Fig. 6-A: boys without health problems; Fig. 6-B: girls without health problems).

Unlike boys without health problems, As can be seen from (Fig. 7-A), for the rest of the signs the relative proportions of the growths are too low and this gives reason to claim that the applied funds in the activities with these boys did not have a constructive effect on the following motor skills: explosive force of lower limbs (indicator 8 - change by only 1.37%); spine flexibility (indicator 11 - 2.08%); the static force of the comfortable upper limb (indicator 5 - by 6,16%); speed and speed of boys with special needs (indicator 4 - 7,83% ((Fig. 7-A). The analysis in (Fig. 7-B) shows that; in 5 of the indicators the relative shares of the growth rates are below 10% (moving between 0.54% and 7.20%), meaning that these increases are insignificant and with respect to the respective signs the zero

hypothesis. However, this does not apply to indicators 6, 7 and 9. As can be seen from (Fig. 7-B), significant positive changes occurred during the experiment with respect to:the static force of the upper limbs (in the comfortable with 17.68% and in the incompetent limb by 16.75%) an in the blast muscle of the abdominal musculature (by 15.74%).

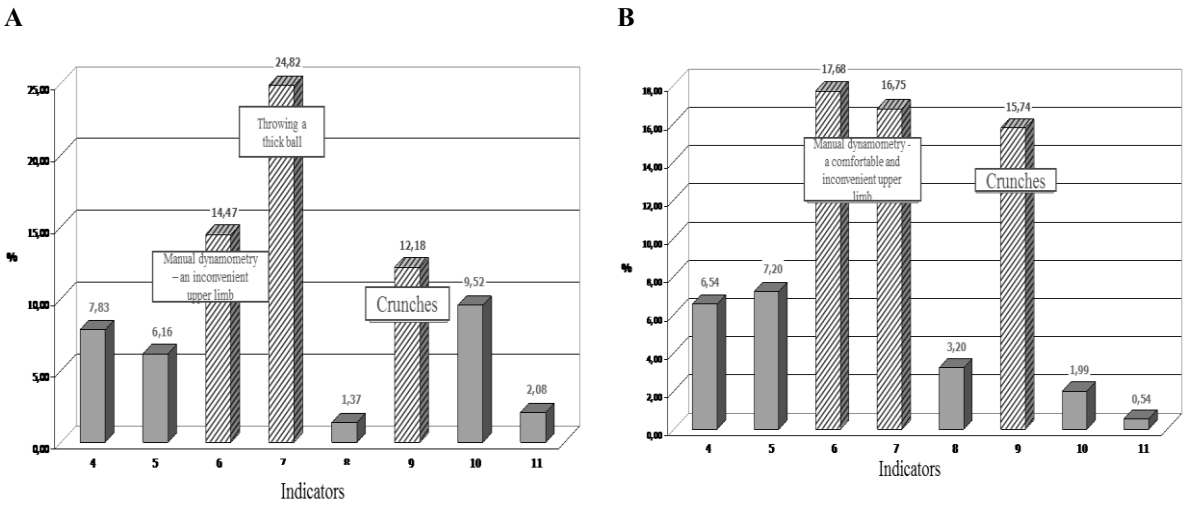


**Fig 7.** Relative percentage (in%) of changes of physical capacity characteristic in boys and girls with special educational needs at the end of the experimental period (Fig. 7-A: boys with special educational needs; Fig. 7-B: girls with special educational needs).

The analysis of the (Fig 8-A) as can be seen; in general the means of physical education and sport have had the greatest impact on the physical capacity of boys with cognitive problems. 6 of the experimental signs have seen significant positive changes in these boys. Proof of this is the relative proportions growths that are higher than the critical. Also, speed endurance (indicator 10 - growth is 24.21%); the explosive force of the upper limbs (indicator 7 - by 18.97%); speed (indicator 4 - by 16.50%); explosive abdominal muscles (9 - 15.00%); the static power of both the comfortable and the awkward upper limb (indicators 5 and 6 - 11.06% and 10.41%, respectively). Fig. 8-A shows that; the percentage changes in the mean levels of the physical signs of exercise in boys with hearing deficiencies vary between 1.10% and 8.15%, which suggests that the impacts applied were not effective enough.

The last special group includes visually impaired boys. As can be seen from (Fig. 8-A), and in this group, overall, the increments are very small, nevertheless, it is clear from the figure that the efforts of pupils and teachers have caused a significant improvement in the explosive force of the upper limbs (index 7). As you can see, the growth rate is almost equivalent to that achieved by children with cognitive problems (18.48% vs. 18.97%).Very close to the limit value is the relative share of the change in the development of the speed of the boys in short distances (indicator 4 - 9,72%).

The comparative analysis of growths in the three groups of girls with different specific deficits (Fig. 8-B) shows that; significant increases have been achieved: girls with visual problems - in terms of the explosive force of abdominal muscles (indicator 9 - by 17.39%) and speed endurance (indicator 10 - by 15.57%); girls with cognitive problems - also with respect to the explosive force of the abdominal muscles (by 18.37%), as well as the explosive force of the upper limbs (by 13.69%); girls with hearing problems - in terms of the static force of the comfortable upper limb (indicator 5 - by 15.08%).

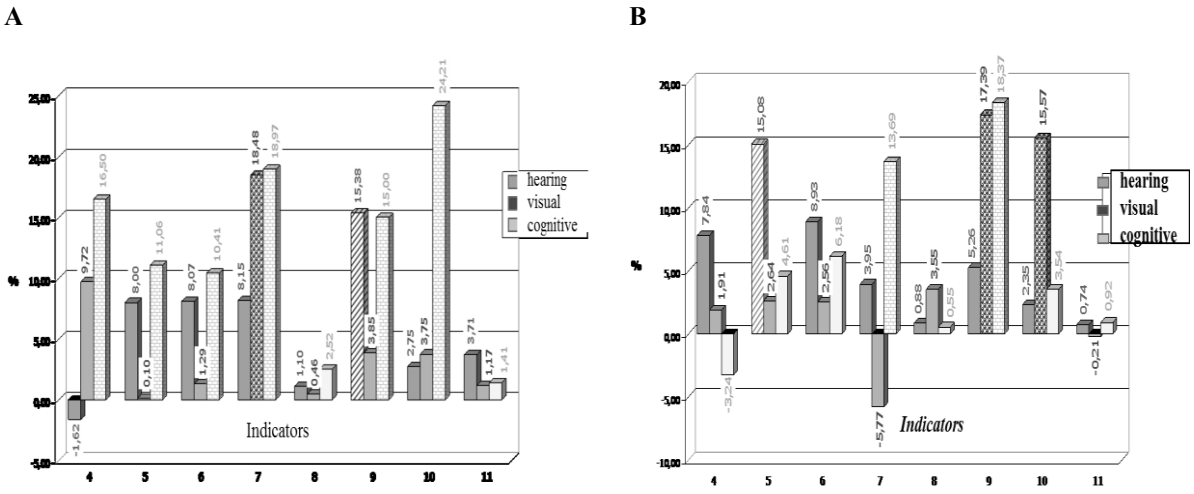


**Fig 8.** Comparative analysis of growth rate (in%) the boys and girls with different specific deficits at the end of the experimental period (Fig. 8-A: boys with different specific deficits; Fig. 8-B: girls with different specific deficits).

## Discussion

According to our research results; It has been suggested that most of the teachers' physical education and sports curriculum are not clear enough to work with children with disabilities. It was determined that the materials needed by teachers were insufficient. While the attitude of the school management supports inclusive education; It has been determined that it is not sufficiently involved in its execution. Considering the problems regarding the pedagogical development of the staff, it was determined that university education was not sufficient to prepare teachers to work with children with disabilities. Physical education and sports allow individuals with disabilities to come together with sound and disabled individuals, and fulfill an extremely important function for inclusion aimed at reaching special education (Majoko, 2017). Similarly, previous research reveals that inclusive education in physical education and sports should focus on the strengths of teachers rather than children's deficits (Ballard, 2012; Majoko, 2019). Therefore, teachers should focus on teaching and learning about what children can do instead of what they cannot. In a study, Vickerman and Coates (2009) suggested that PE teachers have limited experience in flexibly interpreting the National

Curriculum and have limited perspectives on how physical education should be taught and evaluated. According to our findings; It is observed that boys and girls who need and do not need special education have a homogeneous BMI index calculated and more than half of them have normal body weight (Fig 1. A-B-C-D). These values of the BMI index are based on the test results at the beginning of the sports-pedagogical experiment; It gives a reason to believe that boys and girls who need and do not need special education in general have normal body weight.

According to our research findings (Figure 2. A-B-C-D); When the change in physical capacity characteristics of boys and girls between the ages of 11 and 14 with and without special education needs is examined; At the beginning of the sports-pedagogical experiment, it was found to be relatively homogeneous in terms of the physical capacity examined. In some cases; relative homogeneity is observed. Inclusive physical education (PE) prioritizes access for all to ensure participation in the subject area and physical capacity more generally (Simpson and Mandich, 2012; Majoko, 2019). Teachers' pedagogical practices are a fundamental social justice issue in regard to improved learning outcomes for all children. In addition to teachers' strategies to structure learning environments, the characteristics of their peers also potentially affect the experiences of SEN children in PE (Hodge et al., 2009; Spencer-Cavaliere and Watkinson, 2010). Creating a sense of belonging to the group in physical education and sports lessons, increasing motivation and providing different learning experiences gives children opportunities to participate significantly in PE and has a positive effect in terms of their physical capacities.

The analysis made so far has shown that there are some smaller differences between the average levels of physical capacity in the groups of boys and girls without and with special needs. The existence of differences, however, does not justify conclusive conclusions on the advantages of one or other of the groups ($Pt \geq 95\%$) (Fig. 3 and 4- A - B). SEN students experience limited participation in lesson activities in PE. PE is six times less likely to report high self-efficacy than higher-grade students (Bertills et al., 2018). Participation of students in need of special education in PE classes can provide important opportunities to gain the knowledge and skills necessary to lead an active lifestyle in the future (Maxwell et al., 2018). Experienced teachers can create a meaningful learning environment that supports autonomy with lessons structured in comprehensive PE environments that can promote the physical capacity, social, emotional and cognitive benefits demanded for PE (Shirazipour et al., 2018). Physical education and sports classes provide the opportunity to increase the physical development of children, develop their physical capacities and develop valuable skills that they will need both in their education and in their future lives.

In order to solve the aim and objectives of the study, the average levels and the variability of the signs of physical capacity in children with different specific deficits - hearing, visual or cognitive impairments were revealed. Hearing impaired boys show that they are characterized by a lower

physical development than the total number of children with visual impairment. Shows that homogeneous and relatively homogeneous with respect to all the studied features of physical development and physical capacity. Proof of this is the coefficient of variation, which ranges between 3-4% and 30%. The comparative analysis of the boys with cognitive and visual problems shows that here both groups have the advantage of half of the tested signs and weaker results on the other half. However, the only driving quality that boys with cognitive problems are significant compared to boys with visual problems is the blast of abdominal muscles (Fig 5. A-B-C). The structure of PE lessons, both in terms of physical capacity and social adaptations, is important for the participation of students with SEN in PE. Different adaptations and modifications are required, depending on the type of disability. Meaningful learning experiences for students with SEN in PE are extensively dependent on teachers' skills to and attitudes toward communicating and structuring their teaching in an inclusive direction (Jordan et al., 2010). Adaptations that provide meaningful participation and learning experiences in physical education lessons for students who need special support require long-term planning by teachers to improve physical capacity.

For the purposes of our the study, the results of the initial sports-pedagogical testing of girls with various specific deficits also underwent mathematical and statistical processing through variance analysis. When girls with hearing problems are compared with girls with vision problems; It is clear that the latter has higher values in the indicators that characterize physical development. But, which means that the advantage of visually impaired girls with respect to physical development indicators is insignificant and can therefore be explained by accidental causes. In our opinion, is quite logical, due to the difficulties experienced by children with visual problems, in the orientation in space, which makes their free movement in physical exercises difficult. The analysis of at the beginning of the experiment, girls with cognitive problems have higher levels than those with hearing problems, a level of development of speed endurance, but this advantage is insignificant. In the other studies of physical fitness, the mean values are in favor of hearing impaired children, it is. the differences are insignificant. The latter comparison between the groups of girls with visual and cognitive deficits shows that, in general, the girls in the first group, for obvious reasons, have a lower level than the girls with cognitive impairment (Fig 5. D-E-F). Inclusion in PE is significantly different from other subject areas, since the implementation of the PE syllabus include activity specific facilities and equipment, seasonal activities and safety issues (Morley et al., 2005; Fitzgerald and Stride, 2005; Coates and Vickerman, 2010), however, it is evident children with SEN take part in a narrower range of PE activities compared with their non-disabled peers. As a result, including children with SEN in PE lessons is fundamental to their cognitive, social, emotional and physical capacity development. In contrast, where children with SEN report negative experiences in PE they perceive this to be due to bullying by pers, or when they feel they are being restricted from taking part fully in the lesson due to poor differentiation from the teacher (Goodwin and Watkinson, 2000).

To determine the effect of physical education and sports training, at the end of the observed period, a new sports and pedagogical test was carried out for all students involved. As a result of the effects applied with physical education and sports tools, it shows that at the end of the experiment period, men without health problems increased their success in all observed physical capacity symptoms. In general, physical education and sports tools were observed to have different effects on the physical capacities of boys with cognitive, hearing and vision problems compared to the groups (Fig. 6-A; Fig. 7-A; Fig. 8-A). According to our findings; shows that physical education and sports training practices in the classroom do not cause significant changes on the physical capacities of girls with cognitive, hearing and vision problems. special needs. The results are lower than girls without health problems. This requires adequate changes to the curriculum and methods used at school (Fig. 6-B; Fig. 7-B; Fig. 8-B). Today physical education and sports lesson is accepted as an important part of special education practices (Buchanan et al., 2017). It is emphasized that physical education and sports lesson offered to students with special needs should be integrated into special education and it should support and develop the physical capacity field (Toptaş Demirci and Demirci, 2018). Research shows that, while children with SEN enjoy being physically active (Rekaa et al., 2018), their progression in PE is still hampered by a broad range of factors, including: school culture (Tripp et al., 2007); lack of paraprofessional support (Neville et al., 2020); over-emphasis on sporting activities (Qi and Ha, 2012) and, subsequently, on competition and winning and losing (Fitzgerald and Stride, 2012); and, from the perspective of SEN children themselves, a lack of appropriateness in the design of PE classroom activities and of curriculum, which they feel are poorly matched to their individual their abilities and needs (Maher, 2017).

However, for many Physical Education teachers, the unique responsibility it brings is a permanent challenge at all stages of professional experience and often encompasses the complexity of education and health problems. These include lack of inclusive skill training, lack of support infrastructure, insufficient resources, lack of familiarity with special equipment, and limited understanding of children SEN (Haegele et al., 2017). There is a longstanding recognition within PE of the challenges associated with including children who vary in physical ability and learning preference (Makopoulou and Thomas, 2016). International research shows that children SEN are still not accessing or being fully included into educational programs within mainstream schools (Rieser, 2013).

## Conclusion

The results of the study showed that the vast majority of teachers surveyed were not open enough to work with children with disabilities in the physical education and sports curriculum. The comparative analysis of physical fitness in children without and with special educational needs shows that, in spite of some exceptions, at the beginning of the sport-pedagogical experiment the level of

development of the physical capacity of boys and girls without and with special needs does not differ significantly, which is a guarantee of correctness at the start of the experiment. Each of the groups of children with specific deficits has its own features related to the nature of the disability in question. The emphasis on work during future physical education and sports activities should be focused on those signs of physical capacity in which the group has the lowest marks. Efforts to develop the other signs - those with the highest scores - will not have the same building effect on the physical capacity of children with special needs. At both the beginning and the end of the sport-pedagogical experiment, the assembled sets are homogeneous and relatively homogeneous in terms of the physical signs under study. The means of physical education and sports applied in the classroom did not cause significant changes in the levels of the majority of the examined signs of physical capacity, both for boys and girls without and for those with special needs. This necessitates adequate changes in the curricula and the methods used in the school.

**Limitation**

The theme limitation of this research is the sample size. As an exploratory study time dependent, the sample was limited in Turkey with a strong geographic region. The findings provided valuable information about the physical capacities of SEN students in PE classes, and these can be confirmed by a larger sample group from schools of different sizes and locations. In addition, the research population can be expanded to include curriculum.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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