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THE LEVEL OF MOTOR SKILLS OF LEADER FOOTBALL ACADEMY PLAYERS AGED 11-12 IN THE ANNUAL TRAINING CYCLES

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Abstract

The basis for a player playing effectively during a match are football skills. In turn, a high level of motor preparation (speed, strength, endurance, and coordination skills) allows one to fully demonstrate one's sports potential. It is therefore understandable that significant attention is paid to motor preparation during training. However, it should be remembered that training units must be adapted to the requirements of the competition season and specific matches. In addition, an important aspect is to develop the player's psychomotor skills so that he or she is able to effectively implement the coach's assumptions during the match.

The collected research results provided answers to three research questions. First, the level of fitness and coordination abilities of 11-12-year-old players was determined. Based on the research conducted, it can be concluded that young football players of the "Lider" Football Academy are characterized by an average level of fitness and coordination preparation. The next research question concerned the trials in which football players of the "Lider" Football Academy achieved the best and worst results. The highest average point values over the year were obtained by young football players in the jumping test $\bar{x} = 54.75/57.15$ points, and the weakest in the test testing the strength of abdominal muscles $\bar{x} = 45.00/48.05$ points and in the balance test $\bar{x} = 45\ .85/50.50$ points. A slight increase in average test results can be observed in one test: "standing long jump" - an increase of 10%. Statistically significant changes were observed in the following tests: "reaching bend in standing", "hanging on bent arms" and "sitting from lying down", where the average results increased by 48% ($\alpha = 0.0327$), 22% ($\alpha = 0.0418$) and 12% (α=0.0497). Only in the "equivalent attitude" sample, no improvement in the average value of results was observed between the first and second test dates. The average value obtained in this sample decreased by 1.7%.

Conclusions

1. Moderate individual differences in results in fitness and coordination tests of motor skills were observed among the examined football players.
2. Players of the "Lider" Football Academy aged 11-12 have an average level of fitness and coordination skills. They achieved the best results in the jumping test, and the weakest in the balance test and in the test assessing abdominal muscle strength.
3. In the "standing reach", "hanging on bent arms" and "sitting from lying down" tests, statistically significant differences were observed between the average results of the first and second test dates, which proves the impact of sports training on changes in motor skills.

Key words: fitness, coordination of motor skills, annual training cycle

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Introduction

Football is the most popular sport in the world. A huge number of athletes associated with many associations compete at every stage of sports advancement, which makes this discipline highly competitive. Therefore, in order to achieve the best results in competition, players should have a specific and high level of key technical, tactical, mental and motor skills. The latter constitute the basis for developing other skills. They are defined as a set of skills enabling the implementation of specific body movements enabling effective movement on the pitch, as well as sets of specific and complex movements leading to controlling the ball in accordance with the player's intentions. Motor skills are definitely the main factor influencing a player's effectiveness and efficiency during a match [1, 2]. Young football players perform specific activities on the pitch, such as shooting and hitting the ball, dribbling, and numerous changes in running direction requiring specific technical skills and an appropriately high level of motor skills [3]. Bangsbo [4] indicated that in order to be successful in a football career, it is important to develop speed, agility and strength combined with aerobic and anaerobic abilities. Moreover, it is indicated that motor skills, apart from technical skills, have prognostic and diagnostic significance at the individual and team level

and can be used in selection at various stages of sports advancement [3, 5]. Properly planned diagnosis of the level of physical fitness in the training process can have a positive impact on the assessment of training effectiveness, control of the athlete's short-term and long-term development, and may also have an impact on the prevention of injuries caused by overload [6-8]. Monitoring your fitness level can also have a positive impact on individualizing a player's training given the different demands placed on a player's position on the pitch [9-11].

Objective of the work

The aim of the research was to obtain knowledge about the level of motor skills of the Lider Football Academy players aged 11-12 in an annual training cycle.

Material and methods

The research included a group of players (n=20) aged 11-12 years playing football at the "Lider" Football Academy (body mass 39 ± 1 kg; body height 148 ± 1.5 cm). All the surveyed young football players started participating in organized football training at the age of 6-7. Over the past 4 years, they have all participated in 8 to 10 hours of football training per week, three 30-minute stretching sessions per week and also participated in inter-club football competitions every other weekend. Young football players were qualified for tests based on the following criteria:

- age 11-12;
- experience of playing for at least 4 years;
- membership in the Lider Football Academy;
- written consent of parents;
- no contraindications to participation in fitness tests.

Selected physical fitness tests of the EUROFIT test was used to assess the fitness of young football players [12]. For the purposes of the research, the following tests of the European Physical Fitness Test were carried out:

PB1 – balance test (equivalent stance)
PB2 – flexibility test (standing reach bend)
PB3 – arm strength test (hanging on a bar with bent arms)
PB4 – abdominal muscle strength test (sit-ups)
PB5 – power test (standing long jump)

The study consisted of two stages: the first one started on March 2, 2020 and lasted two training units, while the second one ended the one-year training cycle and took place on March 1, 2021. The European Physical Fitness Test tests were conducted on the "Orlik" school playground at Adam Mickiewicz Primary School No. 7 in Lomża.

The following statistical analysis methods were used to descriptively and graphically present the results:

- arithmetic mean: $\bar{x}$;
- standard deviation: s;
- significance of differences: α.

In addition, the minimum (min) and maximum (max) values were determined for each trial.

The significance of differences was determined based on tStudent Test, p>0,05.

Results

Results of fitness and coordination tests for motor skills

The research was conducted on young football players aged 11-12 who play every day at the "Lider" Football Academy under the supervision of an experienced coach. The EUROFIT test consisted of two stages, in which the competitors performed individual tests of the European Physical Fitness Test:

- Stage I – beginning of the annual training cycle;
- Stage II – end of the annual training cycle.

Tab. I. PB1 – balance test (2020).

	Balanced stance (result – number of repetitions)	Number of points obtained (points)
Arithmetic average $\bar{x}$	8.9	45.85
Standard deviation sd	4.27	7.75
Min value	2	32
Max value	18	63

In PB1 from 2020 (equivalent stance), the best result was achieved by participant no. 8, who scored max = 63 points in this attempt. In turn, the weakest result was recorded by player no. 5, who fluctuated around min = 32 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the equivalent stance at the beginning of the annual training cycle was $\bar{x}$ = 45.85 points, and the standard deviation was recorded at the level of sd = 7.75 points.

Tab. 2. PB2 – flexibility test (2020)

	Standing reach inclination (cm)	Number of points obtained (points)
Arithmetic average $\bar{x}$	1.65	52.55
Standard deviation sd	6.38	9.10
Min value	- 13	31
Max value	17	74

In PB2 from 2020 (standing reach bend), the best result was achieved by participant no. 17, who scored max = 74 points in this attempt. In turn, the weakest result was recorded by player no. 13, who fluctuated around min = 31 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the flexibility test at the beginning of the annual training cycle was $\bar{x}$ = 52.55 points, and the standard deviation was recorded at the level of sd = 9.10 points.

Tab. 3. PB3 – arm strength test (2020)

	Hang on bent arms (s)	Number of points obtained (points)
Arithmetic average $\bar{x}$	15.93	50.75
Standard deviation sd	12.017	9.24
Min value	0	30
Max value	39.6	66

In PB3 from 2020 (hanging on bent arms), the best result was achieved by participant no. 19, who scored max = 69 points in this attempt. In turn, the weakest result was recorded by player no. 20, who fluctuated around min = 30 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the arm strength test at the beginning of the annual training cycle was $\bar{x}$ = 50.75 points, and the standard deviation was recorded at the level of sd = 9.24 points.

Tab. 4. PB4 – Abdominal muscle test (2020)

	Sit-ups from lying down (number of repetitions in 30 s)	Number of points obtained (points)
Arithmetic average $\bar{x}$	20.10	45.00
Standard deviation sd	3.40	6.96
Min value	14	32
Max value	25	55

In PB4 from 2020 (sit-ups in 30 seconds), the best result was achieved by three participants no. 3, 9 and 14, who scored max = 55 points in this attempt. In turn, the weakest result was recorded by player no. 5, who fluctuated around min = 32 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the abdominal muscle strength test at the beginning of the annual training cycle was $\bar{x}$ = 45.00 points, and the standard deviation was recorded at sd = 6.96 points.

Tab. 5. PB5 – jumping test (2020)

	Standing long jump (cm)	Number of points obtained (points)
Arithmetic average $\bar{x}$	165.15	54.75
Standard deviation sd	16.33	6.52
Min value	136	43
Max value	191	65

In PB5 from 2020 (standing long jump), the best result was achieved by participant no. 2, who scored max = 65 points in this attempt. In turn, the weakest result was recorded by player no. 15, who fluctuated around min = 43 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the jumping test at the beginning of the annual training cycle was $\bar{x}$ = 54.75 points, and the standard deviation was recorded at the level of sd = 6.52 points.

Tab. 6. PB1 – balance test (2021)

	Balanced stance (result – number of repetitions)	Number of points obtained (points)
Arithmetic average $\bar{x}$	8.75	50.50
Standard deviation sd	4.13	6.11
Min value	4	35
Max value	21	60

In PB1 from 2021 (equivalent stance), the best result was achieved by participant no. 8, who scored max = 60 points in this attempt. In turn, the weakest result was recorded by player no. 9, who fluctuated around min = 35 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the equivalent stance at the end of the annual training cycle was $\bar{x}$ = 50.50 points, and the standard deviation was recorded at the level of sd = 6.11 points.

Tab. 7. PB2 – flexibility test (2021)

	Standing reach inclination (cm)	Number of points obtained (points)
Arithmetic average $\bar{x}$	3.20	54.00
Standard deviation sd	6.78	9.38
Min value	-13	32
Max value	18	75

In PB2 from 2021 (standing reach bend), the best result was achieved by participant no. 17, who scored max = 75 points in this attempt. In turn, the weakest result was recorded by player number 10, who fluctuated around min = 32 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the flexibility test at the end of the annual training cycle was $\bar{x}$ = 54.00 points, and the standard deviation was recorded at sd = 9.38 points.

Tab. 8. PB3 – arm strength test (2021)

	Hang on bent arms (s)	Number of points obtained (points)
Arithmetic average $\bar{x}$	20.51	54.50
Standard deviation sd	13.19	8.11
Min value	5.3	42
Max value	44.7	68

In PB3 from 2021 (hanging on bent arms), the best result was achieved by participant no. 19, who scored max = 72 points in this attempt. In turn, the weakest result was recorded by player no. 11, who fluctuated around min = 40 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the arm strength test at the end of the annual training cycle was $\bar{x}$ = 54.50 points, and the standard deviation was recorded at the level of sd = 8.11 points.

Tab. 9. PB4 – Abdominal muscle test (2021)

	Sit-ups from lying down(number of repetitions in 30 s)	Number of points obtained (points)
Arithmetic average $\bar{x}$	22.8	48.05
Standard deviation sd	3.46	6.99
Min value	16	35
Max value	29	60

In PB4 from 2021 (sit-ups in 30 seconds), the best result was achieved by athlete no. 14, who scored max = 60 points in this attempt. In turn, the weakest result was recorded by player no. 5, who fluctuated around min = 35 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the abdominal muscle strength test at the end of the annual training cycle was $\bar{x}$ = 48.05 points, and the standard deviation was recorded at sd = 6.99 points.

Tab. 10. PB5 – jumping test (2021)

	Standing long jump (cm)	Number of points obtained (points)
Arithmetic average $\bar{x}$	184.45	57.15
Standard deviation sd	16.91	6.56
Min value	153	45
Max value	212	68

In PB5 from 2021 (standing long jump), the best result was achieved by the participant no. 14, who scored max = 68 points in this attempt. In turn, the weakest result was recorded by player no. 15, who fluctuated around min = 45 points. The arithmetic mean of points obtained by the players of the "Lider" Football Academy in the jumping test at the end of the annual training cycle was $\bar{x}$ = 57.15 points, and the standard deviation was recorded at the level of sd = 6.56 points.

Changes in the level of conditioning and coordination of motor skills in the annual training cycle

During the annual training cycle, the players of the "Lider" Football Academy systematically practiced three times a week and took part in football tournaments. They consistently implemented the coach's assumptions and improved the level of their skills, both purely football (technical) and those related to fitness and coordination preparation. Therefore, the tables below compare individual attempts of the European Physical Fitness Test from the beginning and end of the annual training cycle and provide a detailed analysis of the changes that occurred over the year.

Tab. 11. Comparison of the results from the first and second stages of PB1 (equivalent stance) obtained by competitors in the European Physical Fitness Test

	Result from the 1st stage	Number of points obtained (points)	Result from the 2nd stage	Number of points from the 2nd stage	Point difference
Arithmetic average $\bar{x}$	8.90	45.85	8.75	50.50	4.65
Standard deviation sd	4.27	7.75	4.13	6.11	4.52
Min value	2	32	4	35	-3
Max value	18	63	21	60	13

In PB1, the players of the "Lider" Football Academy performed a task requiring a balance stance. Over the course of the year, the greatest progress was recorded in players no. 5 and 6, who scored max = 13 points. It is also worth emphasizing that only two football players, number 8 and 11, recorded a slight regression compared to the first stage, who respectively scored min = -3 and -1 points. In the balance test, the study participants improved by $\bar{x}$ = 4.65 points over the year. The standard deviation in PB1 was sd = 4.52 points. In 11-12-year-old football players, no statistically significant differences in mean test results were found between the first and second test dates in 2020/2021.

Tab. 12. Comparison of the results from the first and second stages of PB2 (standing reach bend) obtained by competitors in the European Physical Fitness Test

	Result from the 1st stage	Number of points from the 1st stage	Result from the 2nd stage	Number of points from the 2nd stage	Point difference
Arithmetic average $\bar{x}$	1.65	52.55	3.20	54.00	1.45
Standard deviation sd	6.38	9.10	6.47	9.38	2.11
Min value	-13	31	-13	32	-2
Max value	17	74	18	75	5

In PB2, the players of the "Lider" Football Academy performed a task involving the reaching reach while standing. Over the course of the year, the greatest progress was recorded by the player number 19, who scored max = 5 points. It is also worth emphasizing that only four football players numbered 7, 12, 15 and 20 recorded a slight regression compared to the first stage, who respectively obtained min = -1 and -2 points. In the flexibility test, the study participants improved by $\bar{x}$ = 1.45 points over the year. The standard deviation in PB2 was sd = 2.11 points. In 11-12-year-old football players, statistically significant differences were found in the average results obtained in the sample between the first and second dates of testing in 2020/2021 (α = 0.0327).

Tab. 13. Comparison of the results from the first and second stages of PB3 (hanging on bent arms) obtained by competitors in the European Physical Fitness Test

	Result from the 1st stage	Number of points from the 1st stage	Result from the 2nd stage	Number of points from the 2nd stage	Point difference
Arithmetic average $\bar{x}$	15.93	50.75	20.51	54.50	3.80
Standard deviation sd	12.017	9.24	13.19	8.11	2.14
Min value	0	30	3.9	40	2
Max value	47.40	69	56.50	72	12

In PB3, the players of the "Lider" Football Academy performed a hanging task on bent arms. Over the course of the year, the greatest progress was recorded by player number 20, who scored max = 12 points. It is also worth emphasizing that none of the football students recorded any regression compared to the first stage. In the arm strength test, the study participants improved by $\bar{x}$ = 3.80 points over the year. The standard deviation in PB3 was sd = 2.14 points. In 11-12 year old footballers statistically significant differences were found in the mean results obtained in the sample between the first and second dates of the 2020/2021 survey (α=0.0418).

Tab. 14. Comparison of the results from the first and second stages of PB4 (sit-ups) obtained by competitors in the European Physical Fitness Test

	Result from the 1st stage	Number of points from the 1st stage	Result from the 2nd stage	Number of points from the 2nd stage	Point difference
Arithmetic average $\bar{x}$	20.10	45.00	22.80	48.05	3.05
Standard deviation sd	3.40	6.96	3.46	6.99	1.00
Min value	14	32	16	35	2
Max value	25	55	29	60	5

In PB4, the players of the "Lider" Football Academy performed a sit-up task. Over the course of the year, the greatest progress was recorded by player number 14, who scored max = 5 points. It is also worth emphasizing that none of the football students recorded any regression compared to the first stage. In the abdominal muscle strength test, the study participants improved by $\bar{x}$ = 3.05 points over the year. The standard deviation in PB4 was sd = 1.00 points. In 11-12-year-old football players, statistically significant differences were found in the average results obtained in the sample between the first and second dates of testing in 2020/2021 (α = 0.0497).

Tab. 15. Comparison of the results from the first and second stages of PB5 (standing long jump) obtained by competitors in the European Physical Fitness Test

	Result from the 1st stage	Number of points from the 1st stage	Result from the 2nd stage	Number of points from the 2nd stage	Point difference
Arithmetic average $\bar{x}$	165.15	54.75	184.45	57.15	2.40
Standard deviation sd	16.33	6.52	16.91	6.56	1.47
Min value	136	43	153	45	-2
Max value	191	65	212	68	6

In PB5, the players of the "Lider" Football Academy performed a standing long jump task. Over the course of the year, the greatest progress was recorded by player number 20, who scored max = 5 points. It is also worth emphasizing that only player No. 7 recorded a regression compared to the first stage, who scored at least = -2 points. In the jumping test, the study participants improved by $\bar{x}$ = 2.40 points over the year. The standard deviation in PB5 was sd = 1.47 points. In 11-12-year-old footballers, no statistically significant differences in average test results were found between the first and second dates of 2020/2021.

Discussion and discussion of the results

At the beginning of the 1950s, players such as Alfredo Di Stefano and Garrincha covered a distance of 2.5 - 3.5 km during a match, while at the beginning of the 21st century, players such as David Becham, Michael Owen, and Deco ran from 12 to 3.5 km. 14 km. This example illustrates that football is constantly changing and the requirements for athletes are becoming greater.

The basis for a player's effectively playing during a match are football skills. In turn, a high level of motor preparation (speed, strength, endurance, and coordination skills) allows one to fully demonstrate one's sports potential. It is therefore understandable that significant attention is paid to motor preparation during training. However, it should be remembered that training units must be adapted to the requirements of the competition season and specific matches. In addition, an important aspect is to develop the player's psychomotor skills so that he or she is able to effectively implement the coach's assumptions during the match.

The collected research results provided answers to three research questions. First, the level of fitness and coordination abilities of 11-12-year-old players was determined. Based on the research conducted, it can be concluded that young football players of the "Lider" Football Academy are characterized by an average level of fitness and coordination preparation. This is evidenced by the fact that the average value of the results in all trials was around 50 points out of 100 possible points [12]. Miller et al. [13] obtained similar results when analysing the motor preparation of soccer players aged 12-13.

The next research question concerned the trials in which football players of the "Lider" Football Academy achieved the best and worst results. The highest average point values over the year were obtained by young football players in the jumping test $\bar{x}$ = 54.75/57.15 points, and the weakest in the test testing the strength of abdominal muscles $\bar{x}$ = 45.00/48.05 points and in the balance test $\bar{x}$ = 45.85/50.50 points. Many authors emphasize that the speed and agility (coordination) aspects are extremely important in the context of a football player. It is therefore surprising that in the EUROFIT test tests, the players of the "Lider" Football Academy are characterized by the highest level of explosive strength. In turn, Miller et al. [13] note that football players are often characterized by a low level of flexibility, which should translate into the results of fitness tests.

Analysing changes in the level of physical fitness of players aged 11-12 training at the "Lider" Football Academy club, we notice statistically significant changes in three out of five EUROFIT trials. A slight increase in average test results can be observed in one test: "standing long jump" - an increase of 10%. Statistically significant changes were observed in the following tests: "reaching bend in standing", "hanging on bent arms" and "sitting from lying down", where the average results increased by 48% ($\alpha = 0.0327$), 22% ($\alpha = 0, 0418$) and 12% ($\alpha=0.0497$). Only in the "equivalent attitude" sample, no improvement in the average value of results was observed between the first and second test dates. The average value obtained in this sample decreased by 1.7%.

Conclusions

1. Moderate individual differences in results in fitness and coordination tests of motor skills were observed among the examined football players.
2. Players of the "Lider" Football Academy aged 11-12 have an average level of fitness and coordination skills. They achieved the best results in the jumping test, and the weakest in the balance test and in the test assessing abdominal muscle strength.
3. In the "standing reach", "hanging on bent arms" and "sitting from lying down" tests, statistically significant differences were observed between the average results of the first and second test dates, which proves the impact of sports training on changes in motor skills.

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