ABSTRACT
Keyword: FIFA 11+, performance capacity, football

The incorrect mastering of technical elements and the coaches' neglect of compensatory exercises at the junior level have led to the alteration of the biomechanics of technical elements and procedures. For this reason, we have studied international literature to find a training protocol with reduced complexity, to be tested in our country and to become an accessible tool for coaches.

The need for this program is felt in the context of frequent injuries to professional players in Romania, as well as amateur players. From the analysis of international research, it is evident that the "FIFA 11+" program significantly reduces the risk of injuries and, at the same time, enhances the performance capacity of players.

Performance capacity can be considered the result of the operational interaction of bio-psycho-educational systems, materialized in recognized values classified based on historically social criteria. It is the complex manifestation of an individual's abilities, materialized in objective values or objectified in points, places, rankings, goals scored, kilograms lifted, rights earned, etc. Performance capacity is determined by four synthetic global factors: aptitudes, attitudes, training, and environment.

Balance performance plays a fundamental role in many athletic activities, and postural control capacity can influence success during competitions. Football players must maintain their balance while under pressure from the opposing team, which seeks to take the ball from them. Over the years, it has been found that the ability to maintain effective balance is based on factors of muscle power and anaerobic capacity.

In football, the quadriceps muscles play an important role in sprinting, jumping, and shooting, while the hamstrings assist the anterior cruciate ligament in preventing anterior pulling forces, decelerating the foot before full extension, and limiting knee hyperextension. Power deficiencies and asymmetries in the hamstrings and quadriceps muscles have been identified as important parameters in preventing knee joint and hamstring muscle injuries in football. Power asymmetries between lower limbs greater than 10% have been associated with an increased risk of knee joint injuries among football players.

The total distance covered varies between 10 and 12 km, depending on the position of each player. In this range, activities such as sliding tackles, head jumps, sudden changes in direction, and high-intensity sprints represent between 1 and 11% of the total running volume, with at least 10-20 maximum sprints exceeding 25.2 km/h. Also, during a match, players reach 80-90% of the maximum heart rate, a lactate concentration of 12 mmol·L-1, an oxygen

consumption rate of 70-80% of VO2max, and a body temperature of up to 39-40°C. On average, an 18-year-old player weighing 70 kg and with a height of 178 cm uses approximately 17 kcal/min or 1540 kcal/match. These values vary depending on the tactical plan adopted, the position on the field, and the quality of the opponent.

By correctly correlating the warm-up with the training theme, the coach can enhance the outcome of training sessions. Warm-up is a fundamental element of training, but the warm-up itself consists of various components: raising body temperature, muscle activation, and joint mobilization, specific sports potentiation. The "RAMP" approach provides a framework around which to build effective warm-up procedures for both competition and training. The warm-up must ensure optimal preparation for performance, and exercises must be selected to allow for augmentation, activation, mobilization, and potentiation without developing excessive fatigue. There are two types of warm-up: one is extensive warm-up, with relatively low intensity and a larger volume, and the other is intensive warm-up, with relatively high intensity and a smaller volume. The coach chooses between the two types of warm-up based on the training lesson's theme.

"FIFA 11+" is an injury prevention program developed by an international group of injury prevention experts with practical experience in various prevention programs for amateur players aged 14 and over. The main elements of a football injury prevention program for players are core strength, neuromuscular control and balance, eccentric hamstring exercises, plyometric exercises, and agility exercises. The effectiveness of the "FIFA 11+" program depends on the correct execution of exercises, which must adhere to established standards.

Regarding the effects on performance capacity, four studies highlight a significant improvement in hamstring muscle strength following the "FIFA 11+" program. However, one study suggested that modifications might be necessary to influence landing biomechanics and reduce associated landing risks. Results regarding the effects of "FIFA 11+" on performance parameters such as agility, vertical jump, balance, dribbling, and sprinting have been contradictory.

As for the effects on injury prevention, there have been variations from statistically insignificant impact to significant impact, with the smallest risk reduction being 26% and the largest being 72%.

The research from Study 1 aimed to determine the potential direct influences of the "FIFA 11+" program on the performance capacity of U17 football players, following the program's application three times a week over a period of 3 months.

Hypotheses:

The application of the "FIFA 11+" program three times a week for 12 weeks has a positive impact on the explosive strength of junior footballers U17.

The application of the "FIFA 11+" program three times a week for 12 weeks has a positive impact on the endurance strength of junior footballers U17.

The application of the "FIFA 11+" program three times a week for 12 weeks has a positive impact on the maximum power of junior footballers U17.

The application of the "FIFA 11+" program three times a week for 12 weeks has a positive impact on the dynamic balance of junior footballers U17.

In the initial phase, we tested the experimental group and the control group. For testing, we used the Opto Jump equipment for explosive strength testing, endurance strength testing, and dynamic balance, and the Desmotec equipment for maximum power testing. We applied the "FIFA 11+" program from 01.03.2022 to 30.05.2022 to the experimental group three times a week, after which we conducted the final testing.

In terms of explosive strength: at the initial test, the intervention group recorded higher results than the control group; however, the differences between the two groups are not statistically significant ($p>0.05$). At the final test, the intervention group recorded results similar to the initial test, while the control group showed a statistically significant decrease ($p<0.05$); at the same time, the differences between the two groups are not statistically significant ($p>0.05$). This hypothesis was rejected.

In terms of endurance strength: at the initial test, the control group recorded higher results than the intervention group, and the differences between the two groups are statistically significant ($p<0.05$). At the final test, the intervention group recorded a statistically significant increase ($p<0.05$), while the control group recorded a statistically significant decrease ($p<0.05$); the intervention group recorded higher results than the control group, and the difference is statistically significant ($p<0.05$). This hypothesis was confirmed.

From the perspective of dynamic balance: at the initial test, the intervention group recorded higher results than the control group, and the differences between the two groups are statistically significant ($p<0.05$); at the final test, the intervention group recorded a statistically significant increase ($p<0.05$), while the control group recorded a statistically insignificant increase ($p>0.05$); the intervention group recorded higher results than the control group, and the differences are statistically significant ($p<0.05$). Regarding lower limb asymmetry, improvements were recorded in both groups, but these are not statistically significant ($p>0.05$). This hypothesis was confirmed.

From the perspective of maximum power: at the initial test, the intervention group recorded lower results than the control group, and the differences between the two groups are statistically significant ($p<0.05$); at the final test, the intervention group recorded a statistically significant increase ($p<0.05$), and the control group also recorded a statistically significant increase ($p<0.05$); the intervention group recorded higher results than the control group, but the differences are statistically insignificant ($p>0.05$). Regarding lower limb asymmetry, improvements were recorded in both groups, but these are not statistically significant ($p>0.05$). This hypothesis was confirmed.

The modified "FIFA 11+" program is divided into three parts: parts 1 and 3 are dynamic, and part 2 is static. For the second part, there are two versions, depending on the training intensity. Part 1 lasts 5 minutes and includes joint mobility and muscle elasticity exercises. Part 2 lasts 7 minutes and includes muscle activation exercises; here, there are two versions: one for intensive warm-up containing exercises for the lower body with mini elastic bands and one for extensive warm-up containing core exercises. Part 3 lasts 8 minutes and includes ball exercises for training session preparation.

The research from Study 2 aimed to determine the potential direct influences of the modified "FIFA 11+" program on the performance capacity of U17 football players, following the program's application three times a week over a period of 3 months.

Hypotheses:

Introducing mini elastic bands in the second part of the warm-up program enhances the quality of muscle activation over time and, consequently, the force developed by the muscles of the lower limbs, by balancing the agonist-antagonist ratio.

Introducing the ball in the third part of the warm-up increases the dynamic and static balance index and the efficiency of players during training.

In the initial phase, we tested the experimental group and the control group. For testing, we used the Opto Jump equipment for explosive strength testing, endurance strength testing, and dynamic balance, and the Desmotec equipment for maximum strength testing. We applied the FIFA 11+ program from 01.09.2022 to 30.11.2022 to the experimental group three times a week, after which we conducted the final testing.

In terms of explosive strength: at the initial test, the intervention group recorded lower results than the control group, and the differences between the two groups are not statistically significant ($p>0.05$); at the final test, both groups recorded a statistically insignificant decrease ($p>0.05$); the intervention group recorded better results than the control group at the final test, but the differences are statistically insignificant ($p>0.05$).

In terms of endurance strength: at the initial test, the intervention group recorded higher results than the control group, and the differences between the two groups are statistically significant ($p<0.05$); at the final test, both groups recorded a statistically significant decrease ($p<0.05$); the intervention group recorded higher results than the control group at the final test, but the difference is statistically insignificant ($p>0.05$).

From the perspective of dynamic balance: at the initial test, the intervention group recorded higher results than the control group, and the differences between the two groups are statistically significant ($p<0.05$); at the final test, the intervention group recorded a statistically significant decrease ($p<0.05$), while the control group recorded a statistically significant increase ($p<0.05$); the intervention group recorded higher results than the control group at the final test, and the differences are statistically significant ($p<0.05$). In terms of lower limb asymmetry, improvements were recorded in the control group and poorer results in the intervention group, but these are not statistically significant ($p>0.05$).

From the perspective of maximum power: at the initial test, the intervention group recorded higher results than the control group, and the differences between the two groups are statistically significant ($p<0.05$); at the final test, the intervention group recorded a statistically significant increase ($p<0.05$), and the control group also recorded a statistically significant increase ($p<0.05$); the intervention group recorded higher results than the control group at the final test, and the differences are statistically significant ($p<0.05$). In terms of lower limb asymmetry, improvements were recorded in the intervention group and poorer results in the control group, but these are not statistically significant ($p>0.05$).

Of the two hypotheses, the one referring to the improvement in the quality of muscle activation in unit time and balancing the agonist-antagonist ratio through mini elastic bands was confirmed, while the second hypothesis was refuted by the decrease in the dynamic balance index.

Following the testing of the control group and the intervention group, multiple changes were identified in explosive strength, endurance strength, dynamic balance, and maximum strength.

In terms of explosive strength, both the "FIFA 11+" program and the modified "FIFA 11+" program did not produce a significant change. The intervention group maintained the level, while the control group recorded a statistically significant decrease.

In terms of endurance strength, the "FIFA 11+" program recorded a statistically significant increase, while the modified "FIFA 11+" program recorded a statistically significant

decrease compared to the "FIFA 11+" program. The control group had a statistically significant decrease.

In terms of dynamic balance, the "FIFA 11+" program recorded a statistically significant increase, and the modified "FIFA 11+" program recorded a statistically significant decrease compared to the "FIFA 11+" program. The values recorded at the final test of the modified "FIFA 11+" program are statistically significantly higher than the values recorded at the initial test of the "FIFA 11+" program. The control group achieved a slight increase, but this is not statistically significant.

Regarding the asymmetry of the lower limbs in dynamic balance, the "FIFA 11+" program obtained values that are 52.76% better, but they are not statistically significant, while the modified "FIFA 11+" program recorded a statistically insignificant decrease. The control group recorded an improvement at the final test, but this is not statistically significant.

In terms of maximum power, remarkable results were achieved. Firstly, the progression from one test to another was excellent, with an improvement of up to 280%. Comparing the two groups, it should be noted that the control group had significantly better results at the initial test. However, at the final test, the intervention group had significantly better results than the control group, considering that there was a significant increase in the control group between the initial and final tests. Through both programs, the imbalance in maximum strength between the left and right lower limbs was reduced.

Both the "FIFA 11+" program and the modified "FIFA 11+" program had significant positive influences on maximum power. Additionally, endurance strength and dynamic balance were improved, especially by the "FIFA 11+" program, while explosive strength was maintained. Another crucial mechanism affected by both programs is the imbalance between the two lower limbs. Both the first and the second program succeeded in reducing the difference between the two lower limbs.

We could say that the two programs complement each other in terms of continuity. Thus, the "FIFA 11+" program appears as a foundational level that needs to be acquired, and the modified "FIFA 11+" program represents the next level of difficulty. Both programs can be used as an introductory part of training, serving as injury prevention.

During the application of the "FIFA 11+" and "FIFA 11+" modified programs, there were no injuries without direct contact with opponents.

In terms of sports performance, the intervention group participated in the Play-Out of the competition during the application of the "FIFA 11+" program, which they won. During the application of the modified "FIFA 11+" program, they qualified for the Play-Off of the

competition with 10 victories out of 10. Subsequently, they won the Play-Off and reached the National Quarterfinals (the top 8 teams in the country).