



Science, Movement and Health, Vol. XXIII, ISSUE 2 Supplement, 2023
September 2023, 23 (2): 508-514
Original article

THE EFFECTS OF THE FIFA 11+ WARM-UP PROGRAMME ON PHYSICAL PERFORMANCE AT U15 – U23 LEVEL IN FOOTBALL: A SYSTEMATIC REVIEW

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Abstract

Problem statement. This research identifies what are the effects of the FIFA 11+ programme on physical performance at U15 – U23 level in football, when is used as a warm-up programme instead of the conventional warm-ups. The "FIFA 11+" program is designed to prevent injuries, but studies have been conducted on its impact on performance capacity across different age groups, starting from 10 years old, in various countries on all five continents, at different levels of performance and for both sexes. However, there are no relevant studies on the program's impact in Romania. This literature review investigated the effects of FIFA11+ on performance in youth football players. The search was conducted on the Springer database and the Google Scholar research engine, resulting in 76 articles, of which 38 were selected after reviewing the titles. After reviewing the abstracts, 16 articles were deemed relevant. The studies were published in English and involved participants aged between 14 and 23 years who all play football, including both males and females. The studies were conducted over varying time periods, from 4 weeks to 30 weeks, and the groups were not homogeneous, resulting in differences in the results obtained. However, analyzing the results obtained for various forms of manifestation of motor qualities, there was an improvement of up to 12.4%.

Conclusions. Studies to date have shown that this program has a greater impact on juniors and amateurs, compared to performance athletes. However, there are also studies that confirm improvements in high performance level, although to a lower extent than in amateur or youth level. Overall, the FIFA 11+ program is a very good alternative to traditional warm-up exercises, especially at the youth and amateur level. After achieving this first step, coaches can adapt the exercises according to the needs of the players.

Keywords: FIFA 11+; physical performance; injury prevention

Introduction

Football is a sport enjoyed by both men and women around the globe, but it is also known for the physical contact involved that can put players at risk of injury according to Pfirmann, Herbst, Ingelfinger, Simon and Tug (2016). To address this concern, FIFA developed the FIFA 11+ injury prevention program in 2006, in collaboration with the Oslo Sports Trauma Research Center and the Santa Monica Orthopaedic and Sports Medicine Center according to Silvers-Granelli et al. (2017). Several studies have since investigated the effectiveness of this program, not only for preventing injuries but also for improving sports performance, and have reported encouraging results according to Bizzini et al. (2013). In order for a warm-up program to be effective, it must adequately prepare players for football, while also being enjoyable and practical for both players and coaches to perform. The FIFA 11+ program is divided into three parts (Silvers-Granelli et al., 2015). Part 1 consists of six running exercises that last for eight minutes. These exercises include running straight ahead, running with hip out, running with hip in, circling a running partner, using shoulder contact for proper landing, and quick running forwards and backwards. Part 2 comprises of strength, plyometrics, and balance exercises that are categorized into three levels for each exercise. These exercises include static bench, static sideways bench, Nordic exercise, single-leg stance, squats, and jumping. Each level increases in difficulty, with exercises such as walking lunges and box jumps included in the advanced stages. Part 2 lasts for 10 minutes. Part 3 consists of running exercises that last for two minutes, including running across the pitch, running with high bounding steps, and running in changing directions. Overall, the FIFA 11+ program is comprised of running exercises, strength, plyometrics, and balance exercises, and a final set of running exercises. The program is designed to gradually increase in difficulty and duration.

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Even though the most significant results of this protocol are seen in the area of injury prevention, it's important to note that these outcomes are achieved by correcting any faulty biomechanics and strengthening the muscles as needed. Based on the findings of the studies conducted, varying degrees of improvement can be observed in different aspects of motor qualities. While this protocol was initially designed at the request of FIFA, the exercises are straightforward and can be easily adapted to other similar sports.

Broadly speaking, performance is defined as the result obtained by the practitioner in performing a given task, perceived, measured and evaluated by him or an observer. Sports performance is a motor performance achieved in an institutionalized context of social comparison, which implies inequality in the distribution of rewards.

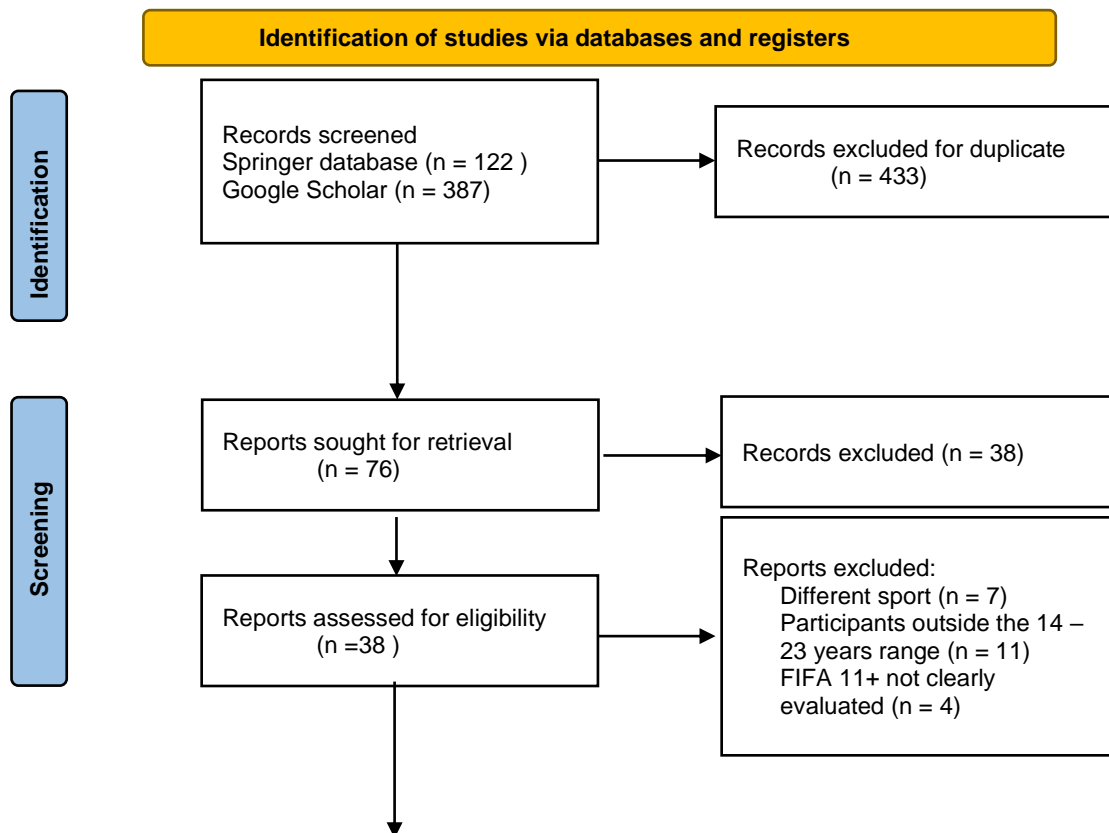
“Sports performance can be defined as a bio-psycho-social value achieved in an official competition, as a result of a multiple capacity determined and appreciated based on rigorously established criteria or scales” (Dragnea, 1994).

“Performance capacity in sports can be considered the result of the operational interaction of bio-psycho-educational systems, materialized in recognized values and classified based on socially historically developed criteria. It is the complex manifestation of the individual's availabilities, materialized in objective or objectified values in points, places, rankings, scored goals, high kilograms, earned rights, etc” (Dragnea, 1996).

The goal of this systematic review is to assess the effectiveness of the FIFA 11+ warm-up program on athlete performance, including muscle strength, sprint speed, jump height, balance, and proprioception in football players. The ultimate aim is to determine whether including the FIFA 11+ program in training sessions is beneficial. This review has significant practical implications, as football is associated with a high risk of injuries, particularly in the lower limbs, which are often caused by modifiable factors. Warm-up programs play a crucial role in injury prevention, and should be easily implemented and inclusive of all players (Sadigursky et al., 2017). The FIFA 11+ program aligns with these principles.

Methods

This literature review utilized randomized controlled trials as the basis of its research. We used the Springer database and the Google Scholar research engine. The following keywords were used to conduct the research: “FIFA 11+ performance”, “11+ warm-up program”, “FIFA 11+ warm-up influences on physical performance” and “FIFA 11+ program on performance”. To find eligible studies, we first screened the titles and authors, then screened the abstracts, and ultimately identified 16 studies that matched our criteria: full-text papers were available, only football players were included (male or female), participants' age ranged from 14 to 23 years old, studies focused on the effects of FIFA 11+ on physical performance, studies on other sports were excluded, and all studies were published in English.



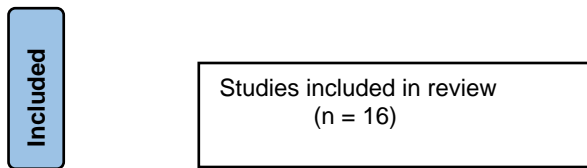


Figure1. PRISMA flow chart for studies selection

Of the 509 initial studies, 433 were excluded as duplicates. Then, we screened the titles and abstracts and excluded 38 studies. From the remaining 38 studies, we screened the full-text articles and excluded another 22 for three reasons: the study was on a different sport (7), the participants were outside the age range (11), and four of them did not clearly evaluate the effects of the FIFA 11+.

Results

In order to better understand the effects of the FIFA 11+ on performance, we have presented a summary of the studies in Table 1. As shown, all studies were conducted on youth and amateur level players, both male and female. In total, there were 645 participants divided into intervention and control groups. The studies varied in length from one training session to two football seasons.

Table 1. Studies summary

Study	Country	Age	Sample	Playing level	Duration	Results
Akbari, Sahebozamani, Daneshjoo and Amiri-Khorasani (2018)	Iran	15–18	24 male players	Youth elite	8 weeks	According to the results of this study, the FIFA 11+ warm-up program was found to improve performance in the vertical jump test in elite male youth soccer players. However, the study also found that the improvement in jump performance was not maintained after one month of halting training. These findings suggest that the FIFA 11+ program may be useful for soccer coaches and trainers who aim to enhance jump performance in their players.
Arsenis, Gioftsidou and Ispyrilidis (2020)	Greece	19–20	32 male players	Amateur	8 weeks	The FIFA 11+ warm-up program was found to be effective in improving balance, concentric strength of the hamstrings, and conventional muscle ratio.
Arundale et al. (2018)	USA	18–20	68 female players	Amateur	2 football seasons	The FIFA 11+ warm-up program may need some adjustments to address landing biomechanics and potentially risky movement patterns, especially when implemented in collegiate women.
Ayala et al. (2017)	Spain	18–22	12 male & 10 female players	Amateur	1 training session	There is no evidence to suggest that the FIFA 11+ or the Harmoknee routines are better than the dynamic warm-up routines commonly used by football players before training sessions and matches.



Lotia, Vyas, S. & Sheth (2023)	India	18–22	20 male players	Youth elite	4 weeks	The results of the study showed that the FIFA 11+ warm-up program had a greater impact on sprint, core muscle endurance, and balance compared to conventional warm-up programs. Therefore, it can be considered a more effective exercise program not only for injury prevention but also for enhancing the performance of football players.
Brito et al. (2010)	Portugal	18–22	20 male players	Amateur	10 weeks	The available evidence suggests that the FIFA 11+ warm-up program is suitable and efficient for football training and conditioning, as it has been shown to enhance strength and promote muscle balance around the knee joint.
Cloak, Nevill, Smith, and Wyon (2014)	UK	20–21	74 male players	Amateur	1 training session	The study suggests that adding an acute bout of whole body vibration after the FIFA 11+ warm-up can improve reactive strength index, which is a measure of neuromuscular function related to jumping ability, but it does not affect agility performance. It is important to note that this is only one study and more research may be needed to confirm these findings.
Daneshjoo, Mokhtar, Rahnama and Yusof (2013)	Iran	17–20	36 male	Youth elite	8 weeks	The FIFA 11+ warm-up program was found to enhance the strength of the hamstring muscles in the leg that is typically used more dominantly by the player. However, there was no significant improvement observed in the strength of the quadriceps muscles during the concentric phase of contraction.
Daneshjoo, Mokhtar, Rahnama and Yusof (2013)	Iran	17–20	36 male	Elite	8 weeks	There was no improvement in players' performance in the speed test (with and without a ball) and 20 m single sprint between pre and post time points with the use of either the FIFA 11+ or HarmoKnee warm-up routines.
Fard, Atri, Yazdi and Shahtahmassebi (2022)	Iran	14–15	30 male players	Amateur	8 weeks	The FIFA 11+ program designed for injury prevention purposes has shown potential to enhance both static and dynamic postural stability in the anterior-posterior and medial-lateral directions.
Ghareeb, McLaine, Wojcik and Boyd (2017)	USA	15–17	34 male players	Amateur	6 weeks	The isokinetic strength peak torque was observed to increase in the quadriceps and hamstrings at a 60-degree angle in both dominant and non-dominant legs in the Nordic hamstring program (NWP) and



Hwang and Kim (2019)	Republic of Korea	20	20 male players	Amateur	12 weeks	hamstrings in the FIFA 11+ program. At a 180-degree angle, the FIFA 11+ program showed improvements across all muscle groups. The implementation of the FIFA 11+ warm-up program resulted in improvements in 30-meter sprint time, coordination, and arrowhead agility scores, as well as enhanced functional movement abilities in exercises such as the deep squat, hurdle step, and rotary stability.
Impellizzeri et al. (2013)	Italy	21–25	20 male players	Amateur	9 weeks	The study found that the FIFA 11+ warm-up program had significant benefits in time-to-stabilization, core stability, flexors eccentric and concentric strength. However, there were no significant improvements in jump, sprint, and agility.
Rahlf, John, Hamacher and Zech (2020)	Germany	14–19	104 male players	Amateur	10 months	The study found that the 20-minute version of the FIFA 11+ warm-up program resulted in beneficial effects on hamstring and ankle flexibility compared to the 10-minute program. However, improvements in static balance, vertical jump performance, and hip flexibility were not significant.
Whittaker and Emery (2015)	Canada	14-16	23 female players	Amateur	4 months	The FIFA 11+ may induce changes in the utilization or loading of the abdominal wall, possibly related to modifications in the neuromuscular control of the trunk, leading to morphological adaptations.
Zarei et al. (2018)	Iran	U16	82 male players	Amateur	One season	The study found that the FIFA 11+ warm-up program resulted in better performance in the Illinois agility test (IAT), vertical jump test, and Bosco counter movement jump (BCMJ) test. However, there was a possibility of reduced performance in the dribbling test.

Pozitive effects:

- 2 studies shows improvement on vertical jump and counter movement jump
- 2 other studies that shows an improvement on sprinting;
- 2 studies shows improvements on vertical jump and counter movement jump;
- 2 studies shows improvements on balance:
- 4 studies shows improvements on hamstrigs strength;
- 1 study shows improvements on core muscle endurance;
- 1 study shows improvements on coordination;
- 2 studies show improvements on agility;
- 1 study shows increased functional movement ability.

No effects:

- 1 study shows that after 1 month of not using the FIFA 11+ the improvement didn't maintain;
- 2 of them didn't find any effects on performance after one training session;
- 1 didn't find any effects on landing biomechanics, it also suggests to modify the programme;
- 1 study didn't find any effects on quadriceps strength;
- 2 studies didn't find any effects on speed and sprint;
- 1 study didn't find any effects on balance;
- 1 study didn't find any effects on vertical jump;
- 1 study didn't find any effects on hip flexibility.

Not conclusive:

- 1 study is saying that FIFA 11+ may increase the neuromuscular control of the trunk;
- 1 study is saying that there is a possibility to reduce performance in the dribbling test.

Discussion

This systematic review aimed to investigate the potential side effects of the FIFA 11+ program on performance. The results suggest that implementing the FIFA 11+ program for a mid-to-long-term period with high adherence can lead to noticeable improvements in most biomechanical measures, balance, and core stability. However, it is not effective in improving technical skills. It should be noted that caution is necessary when using the FIFA 11+ program immediately before a competition, as it may acutely reduce performance parameters such as sprinting and dribbling. Based on four studies, there was a significant improvement in hamstring strength following the FIFA 11+ program. However, one study suggested that modifications might be needed to impact landing biomechanics and reduce risky movement patterns. The results regarding the effects of the FIFA 11+ on performance parameters such as agility, vertical jump, balance, dribbling, and sprinting were contradictory.

We have to keep in mind that these studies were applied on three different continents, and the groups were not homogeneous. This is one reason why we found contradictory data. In order to have positive effects from the FIFA 11+ program, the coach should use it for at least six weeks, three times a week. It seems that this program should be used as a first step in a developing plan. Achieving this first step will give the coach the possibility to modify and adapt the program on the players' needs, as we don't have any football-specific exercises in the current version. We have to keep in mind that this was developed to be an injury prevention program and not a performance enhancement program.

Conclusion

Studies to date have shown that the FIFA 11+ program has a greater impact on juniors and amateurs compared to performance athletes. However, there are also studies that confirm improvements in high-performance levels, albeit to a lesser extent than in amateur or youth level. Overall, the FIFA 11+ program is a promising alternative to traditional warm-up exercises, particularly for the youth and amateur level. Conducting more high-quality studies can help us gain a more comprehensive understanding of the benefits and limitations of the program, as well as identify any potential risks or adverse effects. Additionally, more studies can help identify specific populations that may benefit more from the program and suggest potential modifications that could improve its effectiveness.

References

- Akbari, H., Sahebozamani, M., Daneshjoo, A. & Amiri-Khorasani, M. (2018). Effect of the FIFA 11+ Programme on Vertical Jump Performance in Elite Male Youth Soccer Players. *Montenegrin Journal of Sports Science & Medicine*, 7, 17-22. doi: 10.26773/mjssm.180903.
- Arsenis, S., Gioftsidou, A., Ispyrilidis, I., Kyranoudis, A., Pafis G., Malliou, P. & Beneka, A. (2020). Effects of the FIFA 11+ injury prevention program on lower limb strength and balance. *Journal of Physical Education and Sport*, 20, 592-598. doi: 10.7752/jpes.2020.02087.
- Arundale, A. J. H., Silvers-Granelli, H. J., Marmon, A., Zarzycki, R., Dix, C. & Snyder-Mackler, L. (2018). Changes in biomechanical knee injury risk factors across two collegiate soccer seasons using the 11+ prevention program. *Scandinavian Journal of Medicine & Science Sports*, 28, 2592-2603. doi: 10.1111/sms.13278.
- Ayala, F., Pomares-Noguera, C., Robles-Palazón, F. J., García-Vaquero, M. P., Ruiz-Pérez, I., Hernández-Sánchez, S. & De Ste Croix, M. (2017). Training Effects of the FIFA 11+ and Harmoknee on Several Neuromuscular Parameters of Physical Performance Measures. *International Journal of Sports Medicine*, 38(4), 278 – 289. doi:10.1055/s-0042-121260.



- Bizzini, M., Impellizzeri, F. M., Dvorak, J., Bortolan, L., Schena, F., Modena, R. & Junge, A. (2013). Physiological and performance responses to the "FIFA 11+"(part 1): Is it an appropriate warm-up? *Journal of Sports Science*. 2013, 31, 1481–1490. doi: 10.1080/02640414.2013.802922.
- Brito, J., Figueiredo, P., Fernandes, L., Seabra, A., Soares, J. M., Krusturup, P. & Rebelo, A. (2010). Isokinetic strength effects of FIFA's "The 11+" injury prevention training programme. *Isokinetics and Exercise Science*, 18(4), 211 – 215. doi:10.3233/ies-2010-0386.
- Cloak, R., Nevill, A., Smith, J. & Wyon, M. (2014). The acute effects of vibration stimulus following FIFA 11+ on agility and reactive strength in collegiate soccer players. *Journal of Sport and Health Science*, 3, 293-29. doi: 10.1016/j.jshs.2014.03.014.
- Daneshjoo, A., Mokhtar, A. H., Rahnama, N. & Yusof, A. (2013). Effects of the 11+and Harmoknee Warm-Up Programs on Physical Performance Measures in Professional Soccer Players. *Journal of Sports Science and Medicine*, 12(3), 489 – 496.
- Daneshjoo, A., Mokhtar, A. H., Rahnama, N. & Yusof, A. (2013). The effects of injury prevention warm-up programmes on knee strength in male soccer players. *Biology of Sport*, 30, 281-288. doi: 10.5604/20831862.1077554.
- Dragnea, A. (1994). *Objective and subjective dimensions of performance capacity*. Doctoral thesis.
- Dragnea, A. (1996). *Sports training (theory and methodology)*, Bucuresti, Editura Didactica si Pedagogica,
- Fard, R.B., Atri, A. E., Yazdi, N. K. & Shahtahmassebi, B. (2022). Assessing changes in static and dynamic postural stability in youth football players following the FIFA 11+ injury prevention program. *Science & Sports*, 37, 215. doi: 10.1016/j.scispo.2021.07.003.
- Ghareeb, D. M., McLaine, A. J., Wojcik, J. R. & Boyd, R. M. (2017). Effects of two warm-up programs on balance and isokinetic strength in male high school soccer players. *Journal of Strength and Conditioning Research*, 31, 372-379. doi: 10.1519/JSC.0000000000001509.
- Hwang, J. & Kim, J. (2019). Effect of FIFA 11+ Training Program on Soccer-Specific Physical Performance and Functional Movement in Collegiate Male Soccer Players: A Randomized Controlled Trial. *Exercise Science*, 28(2), 141 – 149. doi:10.15857/ksep.2019.28.2.141.
- Impellizzeri, F. M., Bizzini, M., Dvorak, J., Pellegrini, B., Schena, F. & Junge, A. (2013). Physiological and performance responses to the FIFA 11+ (part 2): a randomised controlled trial on the training effects. *Journal of Sports Sciences*, 31(13), 1491 – 1502. doi: 10.1080/02640414.2013.802926.
- Lotia, K., Vyas, S. & Sheth, M. (2023). The effects of FIFA11+ warm up program on core endurance, sprint performance and balance in under-21 football players. *Khel Journal*. 10(2), 170-175. 10.22271/kheljournal.2023.v10.i2c.2851.
- Pfiffmann, D., Herbst, M., Ingelfinger, P., Simon, P. & Tug, S. (2016). Analysis of injury incidences in male professional adult and elite youth soccer players: A systematic review. *Journal Athletic Training*, 51, 410–424. doi: 10.4085/1062-6050-51.6.03.
- Sadigursky, D., Braid, J. A., De Lira, D. N. L., Machado, B. A. B., Carneiro, R. J. F. & Colavolpe, P. O. (2017). The FIFA 11+ injury prevention program for soccer players: a systematic review. *BMC Sports Science Medicine Rehabilitation*, 9(18). doi: 10.1186/s13102-017-0083-z.
- Silvers-Granelli, H., Mandelbaum, B., Adeniji, O., Insler, S., Bizzini, M., Pohlig, R. & Junge, A., Snyder-Mackler, L. & Dvorak, J. (2015). Efficacy of the FIFA 11+ injury prevention program in the collegiate male soccer player. *American Journal of Sports Medicine*, 43, 2628–2637. doi: 10.1177/0363546515602009.
- Silvers-Granelli, H. J., Bizzini, M., Arundale, A., Mandelbaum, B. R. & Snyder-Mackler, L. (2017). Does the FIFA 11+ injury prevention program reduce the incidence of ACL injury in male soccer players? *Clinical Orthopaedics and Related Research*, 475, 2447–2455. doi: 10.1007/s11999-017-5342-5.
- Rahlf, A. L., John, C., Hamacher, D. & Zech, A. (2020). Effects of a 10 vs. 20-Min Injury Prevention Program on Neuromuscular and Functional Performance in Adolescent Football Players. *Frontiers in Physiology*, 11. doi: 10.3389/fphys.2020.578866.
- Whittaker, J. L. & Emery, C. A. (2015). Impact of the FIFA 11+ on the structure of select muscles in adolescent female soccer players. *Physical Therapy in Sport*, 16, 228-235. doi: 10.1016/j.ptsp.2014.10.007.
- Zarei, M., Abbasi, H., Daneshjoo, A., Barghi, T. S., Rommers, N., Faude, O. & Rössler, R. (2018). Long-term effects of the 11+ warm-up injury prevention programme on physical performance in adolescent male football players: a cluster-randomised controlled trial. *Journal of Sports Sciences*, 36(21), 2447 – 2454. doi: 10.1080/02640414.2018.1462001.