REABILITACIJOS MOKSLAI
Slauga, kineziterapija, ergoterapija
LSU LITHUANIAN SPORTS UNIVERSITY

Reabilitacijos mokslai: slauga, kineziterapija, ergoterapija, *1*(34) 2026, 41–53, eISSN 2538-8673; DOI: https://doi.org/10.33607/rmske.v1i34.2267

Impact of the FIFA 11+ Injury Prevention Programme on Dynamic Balance Performance in Football Players: A Systematic Review and Meta-Analysis

Yulingga Nanda Hanief[1] *, Sri Sumartiningsih[1], Setya Rahayu[1], Heny Setyawati[1], Nasuka[1], Awang Firmansyah[2], Karol Jaskulski[3]

[1] Universitas Negeri Semarang, Semarang City, Indonesia
[2] National Cheng Kung University, Tainan, Taiwan
[3] Józef Piłsudski University of Physical Education in Warsaw, Warsaw, Poland
* Correspondence: ynhanief@students.unnes.ac.id; +62 857 8419 2666

Abstract

Background. Even though FIFA 11+ helps lower injury chances in football, findings on how it affects balance during movement remain unclear. What little exists has not been combined in a way that truly compares results across studies – no solid summary of data yet exists.

Aim. This work looks at how well the FIFA 11+ method helps football players stay balanced during movement. Evidence from multiple studies was gathered and compared carefully.

Methods. A literature search was conducted in the SCOPUS database following PRISMA guidelines. Four eligible studies were selected based on specific criteria, including the use of the FIFA 11+ programme and validated balance tests. Data were synthesised using a random-effects model in Review Manager (RevMan 5.4), with analyses centred on post-intervention outcomes and pre–post differences in dynamic balance performance, to ensure comprehensive evaluation.

Results. The pooled analysis of post-intervention values demonstrated a standardised mean difference (SMD) of 0.36 (95% CI −0.18 to 0.89; $p = 0.54$) for anterior SEBT performance of the dominant leg, indicating no statistically significant difference between the FIFA 11+ and control groups. Heterogeneity was negligible ($I^2 = 0\%$), suggesting high consistency across studies. In contrast, analysis based on pre–post change scores revealed a significant improvement in favour of the FIFA 11+ group (MD = 5.00 cm, 95% CI 3.29 to 6.71; $p < 0.00001$). As this outcome was derived from a single study, heterogeneity could not be assessed. Overall, the findings indicate that the effects of FIFA 11+ on dynamic balance are more sensitively detected through change-score analysis than through post-intervention comparisons alone.

Conclusions. FIFA 11+ might boost how well players stay balanced during movement, based on before-and-after studies, yet score differences alone do not always show it. How much impact occurs depends on how old they are, how often they do it, and whether they actually follow through with each drill.

Keywords: FIFA 11+; dynamic balance; football; injury prevention; meta-analysis

1. INTRODUCTION

Football participation, like involvement in other sports, inherently carries a risk of injury. This statement is reinforced by several studies reporting injuries among football players, both elite athletes and young children (Ferdinand et al., 2025). A longitudinal investigation involving 224 elite players across multiple age categories reported that competition exposure produced substantially higher injury incidence than training (4–11-fold). The study further demonstrated that elevated external load in the three weeks prior to injury, particularly in acceleration counts and total training time, was associated with subsequent injury events (Georgiadis et al., 2024). This supports the concept that not only neuromuscular factors but also workload spikes contribute to injury risk. Based on evidence from epidemiological research (Shalaj et al., 2016), a major research priority of the FIFA Medical and Assessment Research Centre (F-MARC) has been the development of injury prevention programmes that are practical and feasible for routine implementation in football training, particularly at the amateur level.

The FIFA 11+ is a structured warm-up programme that integrates cardiovascular activation with preventive neuromuscular exercises. It was specifically designed for use as a standardised warm-up routine and is organised into three sequential components. The first component comprises running-based activities, while the second emphasises core and lower-limb strength, balance, and plyometric or agility exercises (Hanief et al., 2025; Sumartiningsih et al., 2022). The final component involves running drills incorporating changes of direction. A central feature of the programme is its emphasis on enhancing neuromuscular control throughout all exercises, with particular attention to correct posture and movement quality, including appropriate lower-limb alignment, knee-over-toe positioning, and controlled, soft landings (Bizzini et al., 2011). The effectiveness of neuromuscular approaches is supported by evidence showing that proprioceptive and core stability programmes enhance balance in young footballers, with significant gains in SEBT reach distances and platform stability measures (Kaziūnas & Zachovajevienė, 2020). This aligns with the rationale of the FIFA 11+, which integrates elements similar to those of the FIFA 11+ to promote postural control and injury prevention.

Although injury prevention represents the primary objective of the FIFA 11+ programme, examining the training-related adaptations induced by this intervention may provide insight into the mechanisms underlying the observed reductions in injury incidence. In addition, such analysis can clarify whether participation in the programme confers performance-related benefits beyond injury prevention alone. Previous research investigating the earlier "The 11" programme has reported mixed findings with respect to outcomes such as muscular strength, sprint performance, jumping ability, agility, and core stability (Kilding et al., 2008; Steffen et al., 2008). To date, only one study has specifically explored strength adaptations associated with the FIFA 11+ programme (Brito et al., 2010); however, this investigation employed a non-experimental, single-group pre–post design, thereby limiting causal inference.

Despite the widespread adoption of the FIFA 11+ programme and strong evidence supporting its effectiveness in injury prevention, the specific effects of this intervention on dynamic balance performance remain incompletely understood. Existing studies have reported inconsistent findings, employed heterogeneous outcome measures, or focused primarily on injury incidence rather than neuromuscular performance adaptations. Moreover, no systematic review and meta-analysis has yet quantitatively synthesised the available evidence on the effects of the FIFA 11+ programme on dynamic balance outcomes, such as the Star Excursion Balance Test (SEBT) and Y-Balance Test (YBT).

Dynamic balance, as a component of postural control, is a key determinant of movement efficiency and injury risk reduction (Drozdova-Statkevičienė et al., 2019; Kaziūnas & Zachovajevienė, 2020; Karvelytė & Sipavičienė, 2023). The Y-Balance Test (YBT) assesses dynamic balance by measuring reach performance in the anterior, posteromedial, and posterolateral directions, with the composite score

representing overall postural stability (Turner et al., 2024). Previous studies by Daneshjoo et al. (2012) and Onofrei & Amaricai (2022) have demonstrated that training programmes incorporating balance-oriented exercises, including the FIFA 11+ programme, can lead to significant improvements in balance performance, particularly in sports that predominantly involve lower-limb activity.

Therefore, the purpose of this systematic review and meta-analysis was to critically evaluate and quantitatively synthesise the effects of the FIFA 11+ programme on dynamic balance performance in football players. By distinguishing between post-intervention outcomes and pre–post change scores, this study aims to provide a more nuanced understanding of the balance-related adaptations associated with the FIFA 11+ programme. The findings are expected to offer novel insights into the neuromuscular mechanisms underlying injury risk reduction and to inform evidence-based implementation of the FIFA 11+ programme in football training practice. Based on current evidence, we hypothesised that: (1) the FIFA 11+ programme would produce greater improvements in dynamic balance compared with control conditions, and (2) analyses based on pre–post changes would demonstrate larger effects than post-intervention comparisons alone.

2. METHODS

2.1. Search strategy. A look through recent papers began on Scopus, aiming to pull out findings about how FIFA 11+ helps football players stay balanced during quick movements. The search strategy combined keywords related to the intervention ('FIFA 11+', 'FIFA 11 plus', 'FIFA 11 injury prevention'), outcomes ('dynamic balance', 'postural control', 'balance performance', 'Star Excursion Balance Test', 'SEBT'), population ('football', 'soccer'), and study design ('trial', 'controlled trial', 'randomised'). Words linked training methods to results seen after playing. Each entry had to match at least one expected pattern so results make sense together. In the end, filters guided which articles counted, ensuring relevance across design and subject. To count, reports had to be real articles, appear in respected scientific journals, come out in English. This study is now listed at PROSPERO under the reference number CRD420261280961.

2.2. Study selection and eligibility criteria. Starting from the PRISMA rules, the team picked relevant studies. Once duplicates came out, title and abstract checks happened on both sides separately to toss junk picks. Then each real paper got its turn under strict rules already set – matching or missing flags based on fixed standards using PICOS. Eligibility decisions followed exactly down that path until done. A spot on the list went to studies where football players took part. The main move meant FIFA 11+ led the charge as core treatment. One thing had to be true: a group without the change had to be part of it. Looking at results, balance tests mattered – no shortcuts here. Data needed to be clear enough for calculating real effects.

A few picks stood out – those where FIFA 11+ led the charge without tweaks, like FIFA 11+ Kids. Footballers had to be involved, otherwise doors closed fast. The control group? Missing means no entry here. Results focused on balance, specifically the dynamic kind, or else they got left behind. Data had to back up measurements clearly, nothing vague counted.

2.3. Study characteristics. Key characteristics of the included studies – such as country, study design, participant demographics, intervention and control protocols, intervention duration, and outcome measures – were systematically extracted and summarised in Table 1. The included studies comprised randomised controlled trials and cluster randomised controlled trials conducted across youth, adolescent, and adult football populations, with intervention durations ranging from nine weeks to one competitive season.

2.4. Methodological quality assessment. The risk of bias of the included studies was evaluated using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool. Five domains were assessed: (D1) bias arising from the randomisation process, (D2) bias due to deviations from intended interventions, (D3) bias due to missing outcome data, (D4) bias in measurement of the outcome, and (D5) bias in selection of the reported result. Each domain was judged as 'low risk of bias' or 'some concerns' in accordance with RoB 2.0 guidance.

Overall, most studies demonstrated low risk of bias across domains related to randomisation and outcome measurement, while some concerns were identified primarily in domains concerning deviations from intended interventions and selective reporting (Figure 2). These findings indicate an acceptable methodological quality of the included trials, although the presence of 'some concerns' should be considered when interpreting the pooled estimates.

2.5. Study outcomes and effect size calculation. The primary outcome was dynamic balance performance assessed using validated measures, primarily the Star Excursion Balance Test (SEBT) and Y-Balance Test (YBT). Meta-analyses were conducted using Review Manager (RevMan) version 5.4. When post-intervention means and standard deviations were available, standardised mean differences (SMD) were calculated using a random-effects model. For studies reporting change scores with confidence intervals but without standard deviations, the generic inverse variance method was applied. Mean differences between intervention and control groups were calculated, and standard errors were derived from reported 95% confidence intervals. All pooled estimates are reported with 95% confidence intervals.

2.6. Secondary analysis – Secondary analyses included separate meta-analyses based on outcome reporting format, distinguishing between post-intervention values and pre–post change scores. This approach allowed inclusion of studies with heterogeneous reporting methods while minimising data loss and preserving methodological transparency.

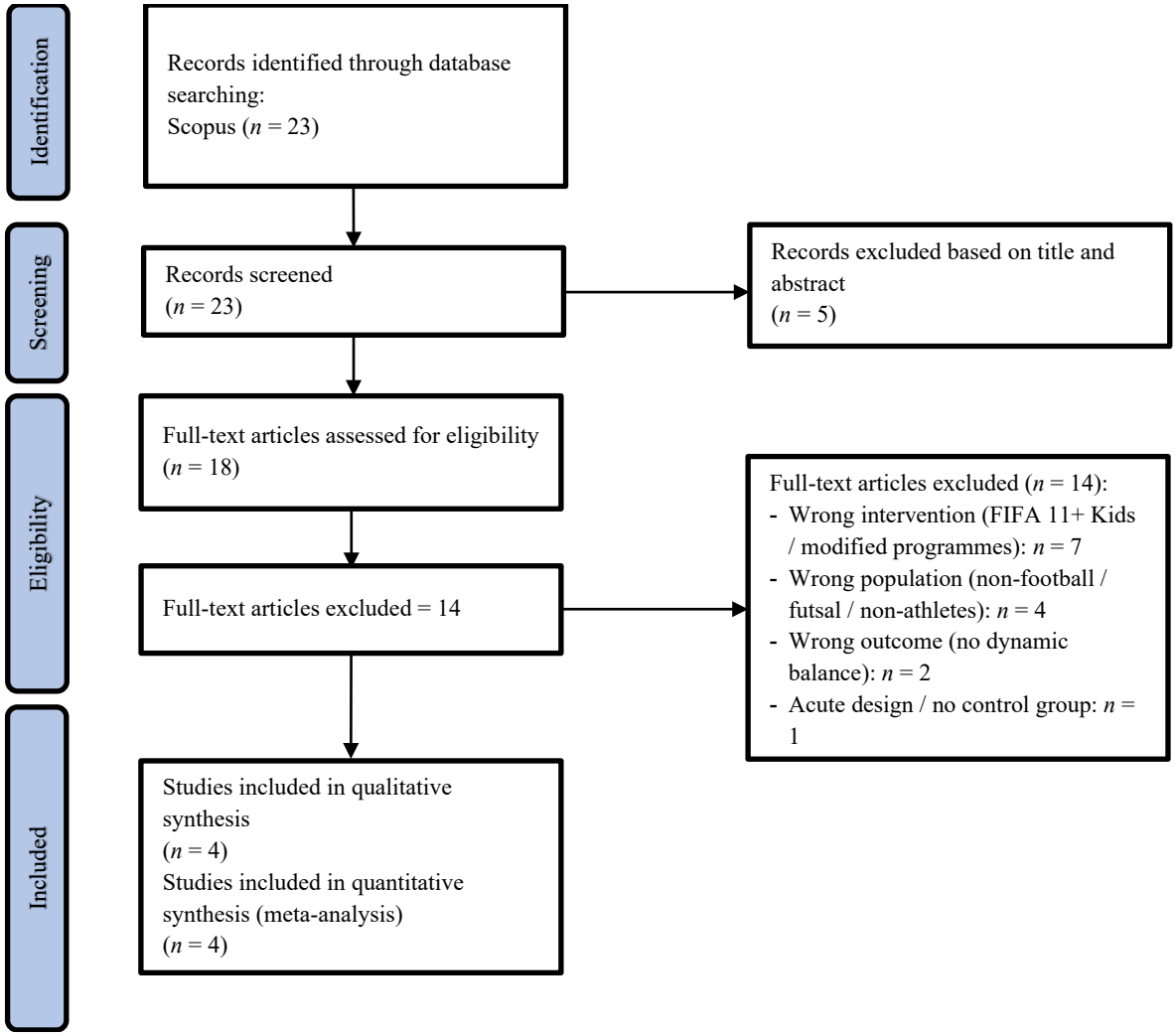

Figure 1. **Flowchart of study selection**

2.7. Statistical analysis – Statistical analyses were performed using Review Manager (RevMan) version 5.4. Effect sizes were calculated as standardised mean differences (SMD) with 95% confidence intervals (CI). A random-effects model was applied to account for expected methodological and clinical heterogeneity among studies. Heterogeneity was assessed using the I^2 statistic and Cochran's Q Test. The level of statistical significance was set at $p < 0.05$.

Continuous data were summarised as means and standard deviations as reported in the original studies. Two analytical approaches were conducted: (1) comparison of post-intervention outcomes between groups and (2) analysis based on pre–post changes. Publication bias was visually explored using funnel plots when sufficient studies were available, and sensitivity analyses were undertaken by excluding individual studies to assess the robustness of the pooled estimates.

3. RESULTS

From Scopus, 23 records were found through the literature review. Once duplicates were cleared, every remaining report got checked – using both title and abstract – to rule out irrelevant work. Five studies fell outside set standards during that step. In the end, 18 completed papers waited their turn for deeper review. Seven showed changes when using tweaked versions of FIFA 11+, while four relied on

full football-specific drills. Population matters too – four studies focused outside football teams, thus they did not count. Then there was the balance part: two lacked results on how players held positions while moving. One more fell apart because it tested injuries after single sessions without comparing to rested groups. In total, only four studies fit every requirement well enough to be analysed both ways. Figure 1 outlines how choices unfolded step by step. Table 1 shows what each included study was like.

Table 1. **The characteristics of included studies**

Author (Year)	Country	Study Design	Sample Size	Population / Key Inclusion	Intervention (FIFA 11+)	Comparator	Duration & Follow-Up
Steffen et al. (2013)	Canada	Cluster randomised controlled trial	226 female players (from 29 teams)	Youth female football players, 13–18 years, tiers 1–3; injury-free at baseline	FIFA 11+ neuromuscular warm-up, 20 min/session, 2×/week; adherence monitored at individual level	Standard warm-up / unsupervised FIFA 11+ delivery	4.5 months (one competitive season)
Impellizzeri et al. (2013)	Italy	Randomised controlled trial	81 male amateur players (FIFA 11+: $n = 42$; Control: $n = 39$)	Male amateur football players (~23 years), competing in official Italian amateur leagues; injury-free and training ≥3×/week	FIFA 11+ neuromuscular warm-up (20–25 min), 3×/week, progressive levels (1–3)	Usual team warm-up	9 weeks
Pardos-Mainer et al. (2019)	Spain	Randomised controlled trial	36 adolescent female players (final analysis $N = 32$; EG = 17, CG = 15)	Adolescent female football players (12–13 yrs), competing in a club academy (Spanish First Division women's youth); ≥4 years of training experience	FIFA 11+ neuromuscular warm-up replacing habitual warm-up, ~15 min/session, 2×/week	Habitual team warm-up	10 weeks
Parsons et al. (2019)	Canada	Cluster randomised controlled trial	47 pre-teen female players randomised; final analysis: IG = 25, CG = 18	Female football players aged 9–11 years (U10–U11), developmental-level club, injury-free at baseline	Full original FIFA 11+ warm-up (Sections 1–3), coach-led, ~20–30 min/session, 1–2×/week	Coach-determined standard warm-up (~10 min)	~5 months (one indoor football season)

The study outcomes of the included trials are summarised in Table 2. Dynamic balance was assessed using validated measures, including the Star Excursion Balance Test (SEBT) and the Y-Balance Test (YBT), across different age groups and competitive levels of football players.

Two studies reported improvements in dynamic balance performance following the FIFA 11+ intervention, particularly in specific reach directions of the SEBT or YBT, while the remaining studies reported no significant between-group differences in balance outcomes compared with standard warm-up protocols. Improvements in balance performance were more consistently observed in studies with higher adherence levels and in adolescent populations, whereas studies involving younger athletes or lower intervention frequencies demonstrated limited or no balance-related benefits.

Table 2. **The study outcomes**

Author (Year)	Primary Outcome(s)	Secondary Outcome(s)	Main Findings
Steffen et al. (2013)	Dynamic balance (Star Excursion Balance Test – SEBT)	Single-leg balance, hopping performance, injury incidence	High adherence to FIFA 11+ significantly improved SEBT reach distances (≈3–5 cm; 4–7%) and was associated with a substantially lower injury risk. Delivery method had minimal influence, whereas adherence level was the key determinant of balance improvement and injury reduction.
Impellizzeri et al. (2013)	Neuromuscular control (time-to-stabilisation), hamstring flexor strength	Dynamic balance (SEBT), core stability, sprint, agility, vertical jump	FIFA 11+ significantly improved neuromuscular control (reduced time-to-stabilisation) and maintained core stability compared with controls. Small improvements in hamstring flexor strength were observed but were of limited practical relevance. No substantial or statistically significant improvements were found for SEBT or other performance outcomes.
Pardos-Mainer et al. (2019)	Dynamic balance (Y-Balance Test: anterior, posteromedial, posterolateral)	Jump performance, change of direction, ankle dorsiflexion, inter-limb asymmetries	The FIFA 11+ significantly improved dynamic balance in the posteromedial and posterolateral directions of the Y-Balance Test in the intervention group, with large effect sizes. No significant between-group differences were observed for the anterior direction. Improvements were also observed in unilateral jumping performance, while change-of-direction performance showed no meaningful enhancement.

Author (Year)	Primary Outcome(s)	Secondary Outcome(s)	Main Findings
Parsons et al. (2019)	Movement control (Landing Error Scoring System – LESS; Y-Balance Test composite score)	Agility (T-Test), vertical jump, trunk muscle endurance, athlete perceptions	No significant between-group differences were observed for LESS or Y-Balance Test scores after the intervention. Dynamic balance performance (YBT) decreased slightly over the season in both groups. The FIFA 11+ group demonstrated a significantly greater improvement in trunk muscle endurance (static plank) compared with controls, while agility improved similarly in both groups.

Note: RCT = randomised controlled trial; Cluster RCT = cluster randomised controlled trial; FIFA 11+ = Fédération Internationale de Football Association 11+ neuromuscular warm-up programme; mo = months; wks = weeks; wk = week; SEBT = Star Excursion Balance Test; YBT = Y-Balance Test; A = anterior; PM = posteromedial; PL = posterolateral; yrs = years.

Overall risk of bias judgements were derived according to Cochrane guidelines. The results of the risk of bias assessment are presented visually using traffic-light and summary plots (Figure 2). Figure 2 presents the risk of bias assessment for the included studies using the Cochrane RoB 2.0 tool.

Note: (A) Traffic-light plot showing domain-level judgements for each included study. (B) Summary plot presenting the proportion of studies judged as low risk or some concerns across each bias domain.

Figure 2. **Risk of bias assessment of the included studies using the Cochrane Risk of Bias 2.0 tool**

Overall, all studies were judged as having either low risk of bias or some concerns. The most common source of concern related to deviations from intended interventions and selective reporting. Importantly, no study was judged to have a high risk of bias, supporting the methodological transparency of the included evidence.

Quantitative synthesis was conducted using a random-effects model due to methodological and clinical heterogeneity across studies. Meta-analysis of post-intervention SEBT anterior reach performance demonstrated a small pooled effect favouring the FIFA 11+ intervention compared with control conditions; however, this effect was not statistically significant. The confidence interval crossed the line of no effect, and heterogeneity was low ($I^2 = 0\%$), indicating consistency among the included studies (Figure 3 and Figure 4). Figure 3 illustrates the pooled effect of the FIFA 11+ programme on SEBT anterior reach distance based on post-intervention values. Figure 4 presents the pooled effect of the FIFA

11+ programme on SEBT anterior reach distance using pre–post change scores derived via the generic inverse variance method.

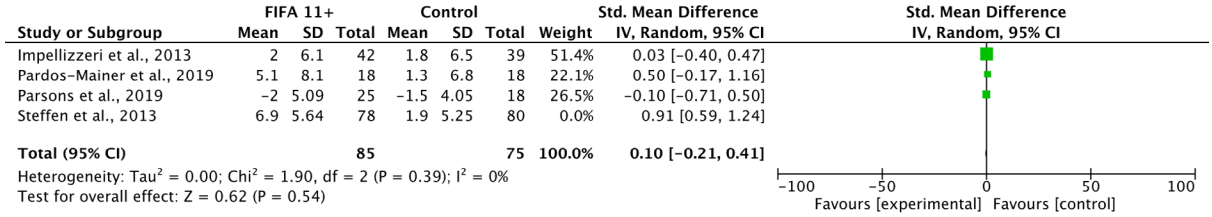

Figure 3. **Forest plot of the effect of FIFA 11+ on SEBT anterior reach distance (post-intervention values)**

Overall, the pooled effect showed a standardised mean difference (SMD) of 0.36 (95% CI −0.18 to 0.89; $p = 0.54$). As the confidence interval crossed zero, no statistically significant difference was observed between the FIFA 11+ intervention and control groups in anterior SEBT post-test scores of the dominant leg. The heterogeneity was negligible ($I^2 = 0\%$), indicating a high level of consistency across the included studies. These findings suggest that, when only post-intervention values are considered, the FIFA 11+ programme does not produce a statistically significant improvement in anterior dynamic balance performance, although the direction of the pooled effect favours the intervention group.

Figure 4 presents the pooled effect of the FIFA 11+ programme on SEBT anterior reach distance using pre–post change scores derived via the generic inverse variance method.

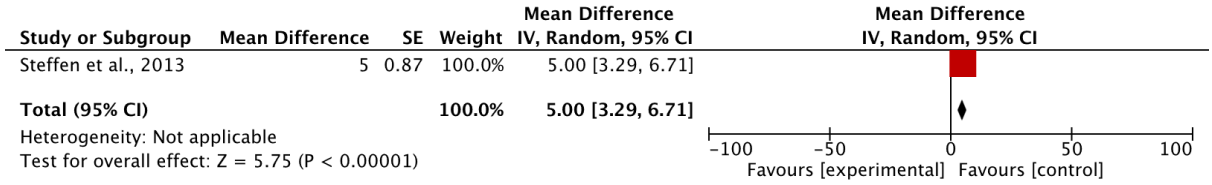

Figure 4. **Forest plot of the effect of FIFA 11+ on SEBT anterior reach distance (change scores)**

The analysis demonstrated a mean difference (MD) of 5.00 cm (95% CI 3.29 to 6.71; $p < 0.00001$), indicating a statistically significant improvement in anterior SEBT performance favouring the FIFA 11+ group. As the confidence interval did not cross zero, the effect was statistically robust. This finding, based on pre–post change scores, indicates that improvements in dynamic balance were significantly greater in the FIFA 11+ group compared with the control group. Heterogeneity was not assessed, as only one study contributed to this outcome. Overall, the change-score analysis suggests that the FIFA 11+ programme produces a clinically meaningful improvement in dynamic balance.

4. DISCUSSION

The main results of this systematic review and meta-analysis show that the FIFA 11+ programme does not consistently improve dynamic balance performance when evaluated using post-intervention values alone. Analysis based on post-intervention values shows that the difference between the intervention and control groups in dynamic balance performance, particularly in the anterior SEBT component, did not reach statistical significance. However, when pre–post changes were analysed, a significant improvement in dynamic balance performance was found in favour of the FIFA 11+ group. These findings

indicate that the effects of FIFA 11+ on dynamic balance are more sensitively detected through analysis of changes within groups than through comparison of final values between groups.

The differences in findings between post-intervention value analysis and pre–post change analysis may be influenced by several methodological factors. First, differences in baseline conditions between groups can obscure the effects of the intervention when only final values are compared. In populations of athletes who already have relatively good initial balance, the room for improvement is more limited, making it difficult to detect the effects of the intervention cross-sectionally. Second, pre–post change analysis is better able to capture neuromuscular adaptations that occur during the intervention period, especially in studies with limited sample sizes. Therefore, the change-score approach in the context of neuromuscular interventions such as FIFA 11+ can provide a more representative picture of the actual effects of training.

Mechanistically, FIFA 11+ is designed to improve neuromuscular control through a combination of core strength training, single-leg stability, dynamic balance training, and plyometric movements with an emphasis on movement quality and body posture (Hanief et al., 2025). These exercises stimulate the sensorimotor system, particularly the integration between proprioceptive input from the lower extremities and central postural control. This adaptation contributes to improved ability to maintain body stability when performing functional movements such as landing, changing direction, and accelerating.

However, the lack of improvement in dynamic balance in some studies can also be explained by the characteristics of the programme and the population. In very young athletes, as reported by Parsons et al. (2019), the neuromuscular system is still in the developmental stage, thus the adaptive response to training stimuli may not yet be optimal. Additionally, the low frequency of FIFA 11+ implementation (e.g. 1–2 times per week) may provide insufficient stimulus to trigger meaningful postural adaptation.

Good dynamic balance plays an important role in preventing football injuries because it allows athletes to maintain control of their joints, especially the knees and ankles, when faced with external disturbances or rapid changes in direction. A deficit in dynamic balance has been associated with an increased risk of lower extremity injuries, including non-contact injuries to the anterior cruciate ligament (Turner et al., 2024). Thus, improving postural control through programmes such as FIFA 11+ has the potential to reduce the risk of injury by improving movement mechanics and joint stability.

The findings in this study are in line with the results of Steffen et al. (2013), which show that improvements in dynamic balance are more pronounced in athletes with a high level of adherence to the FIFA 11+ programme. Conversely, Impellizzeri et al. (2013) reported that although there were improvements in neuromuscular control, improvements in dynamic balance were not always significant. The study by Pardos-Mainer et al. (2019) also showed that improvements in dynamic balance were specific to certain directions on the Y-Balance Test, indicating that balance adaptations did not occur uniformly. In general, the literature shows that the effects of FIFA 11+ on dynamic balance are contextual and influenced by study design, participant characteristics, and intervention dosage.

Several moderating factors appear to influence the effectiveness of FIFA 11+ on dynamic balance. Participant age is an important factor, with adolescent athletes showing better responses than pre-adolescent athletes. In addition, the level of compliance and frequency of programme implementation also play a significant role. Studies with FIFA 11+ implementation at least twice a week and with good supervision tend to report more positive results. The type of balance measurement instrument (SEBT vs. YBT) also contributes to the variation in findings due to the sensitivity of each test in detecting changes in performance.

In practical terms, the results of this study show that FIFA 11+ can provide benefits for dynamic balance when applied consistently and with an adequate training dose. Coaches and practitioners are advised not only to use FIFA 11+ as a formal warm-up, but also to ensure the quality of each exercise,

particularly in terms of balance and core strength components. Adjusting the difficulty level of exercises according to the age and ability level of athletes is also important to maximise neuromuscular adaptation.

The main strength of this study lies in the use of a meta-analysis approach that separates the analysis of post-intervention values and pre–post changes, thereby providing a more comprehensive understanding of the effects of FIFA 11+. Further research is recommended to evaluate the effects of FIFA 11+ on dynamic balance with a more homogeneous design, including standardisation of measurement instruments and reporting of intervention compliance. Studies with longer intervention durations and higher training frequencies are also needed to explore the dose–response relationship. Additionally, future research could examine the direct relationship between changes in dynamic balance and reduced injury risk in the context of football competition.

Limitations

Several limitations of this study should be acknowledged. First, the included studies involved participants with a wide age range (9–23 years), spanning from pre-pubertal to young adult athletes. As discussed, adolescent players tend to show greater responsiveness to the FIFA 11+ programme than younger athletes, which may have contributed to the variability in the pooled results. The lack of age-specific analyses limits the ability to determine whether the intervention is equally effective across developmental stages.

Second, the samples consisted of mixed-sex participants, and sex-specific outcomes were not consistently reported. Considering potential differences in neuromuscular control and balance characteristics between male and female football players, this heterogeneity complicates the interpretation of the overall effect. It may mask sex-dependent responses to the programme.

Third, the meta-analysis was based on a relatively small number of studies ($n = 4$), which restricts statistical power and generalisability. Additional limitations include heterogeneity in outcome reporting methods, differences in SEBT and Y-Balance Test sensitivity, and limited information on intervention compliance and supervision quality, all of which were identified as important moderators of effectiveness.

Future studies should employ more homogeneous designs with standardised balance measurement protocols, transparent reporting of compliance rates, and stratified analyses by age and sex. Research with more extended intervention periods and higher training frequencies is also needed to clarify the dose–response relationship and examine whether improvements in dynamic balance translate into reduced injury risk in competitive football.

5. CONCLUSIONS AND PERSPECTIVES

The FIFA 11+ programme does not demonstrate consistent superiority over control conditions when dynamic balance is evaluated solely using post-intervention values. However, analyses based on pre–post changes indicate that the programme can significantly improve dynamic balance, particularly in the anterior component of the SEBT. The effectiveness of FIFA 11+ appears to be influenced by athlete age, implementation frequency, and adherence to the intervention. These findings support the integration of FIFA 11+ into neuromuscular training in football, while emphasising the need for age- and sex-specific trials with standardised balance assessments to confirm and optimise its benefits.

Author Contributions: Conceptualisation, Y.N.H and S.S; methodology, Y.N.H; software, Y.N.H.; validation, S.R., H.S., and N.; formal analysis, A.F.; investigation, K.J.; resources, K.J.; data curation, K.J.; writing—original draft preparation, Y.N.H.; writing—review and editing, Y.N.H. and K.J.; visualisation, A.F.; supervision, S.S. and S.R.; project administration, A.F. All authors have read and agreed to the published version of the manuscript.
Funding: This research received no external funding.
Informed Consent Statement: Not applicable.
Acknowledgements: No.
Conflicts of Interest: The authors declare no conflict of interest.

References

Bizzini, M., Junge, A., Bahr, R., & Dvořák, J. (2011). Injuries of football referees: A representative survey of Swiss referees officiating at all levels of play. *Scandinavian Journal of Medicine and Science in Sports*, *21*(1), 42–47. https://doi.org/10.1111/j.1600-0838.2009.01003.x

Brito, J., Figueiredo, P., Fernandes, L., Seabra, A., Soares, J. M., Krustrup, P., & Rebelo, A. (2010). Isokinetic strength effects of FIFA's "The 11+" injury prevention training programme. *Isokinetics and Exercise Science*, *18*(4), 211–215. https://doi.org/10.3233/IES-2010-0386

Daneshjoo, A., Mokhtar, A. H., Rahnama, N., & Yusof, A. (2012). The effects of injury preventive warm-up programs on knee strength ratio in young male professional soccer players. *PLoS ONE*, *7*(12), e50979. https://doi.org/10.1371/journal.pone.0050979

Drozdova-Statkevičienė, M., Nemeravičiūtė, A., & Česnaitienė, V. J. (2019). Statinės ir dinaminės pusiausvyros sąsajos atliekant dvigubą užduotį [Connection between static and dynamic balance during dual task performance]. *Reabilitacijos mokslai: slauga, kineziterapija, ergoterapija*, *1*(18). https://doi.org/10.33607/rmske.v1i18.747

Ferdinand, L., Hanief, Y. N., & Manimtim, R. M. (2025). Injury pattern and risk factors in grassroots football: A study of 10-year-old athletes. *Sport, Exercise, and Injury*, *1*(1), 27–39. https://doi.org/10.56003/sei.v1i1.512

Georgiadis, G., van Gaal Appelhof, R., Stoop, R., Peters, J., & Essers, J. (2024). Association between external load and injury incidence in professional and elite-youth football players. *Physical Education and Sports: Studies and Research*, *3*(1), 10–25. https://doi.org/10.56003/pessr.v3i1.316

Hanief, Y. N., Azidin, R. M. F. R., Sumartiningsih, S., & Firmansyah, A. (2025). The effect of 12 times training of the FIFA 11+ on fundamental movements in football academy athletes aged 14–17 as an effort to prevent injury. *Sportis. Scientific Journal of School Sport, Physical Education and Psychomotricity*, *11*(2), 1–18. https://doi.org/10.17979/sportis.2025.11.2.11354

Hanief, Y. N., Sannicandro, I., & Azidin, R. M. F. R. (2025). The effects of the FIFA 11+ programme on lower limb functional outcomes: A systematic review. *Sport, Exercise, and Injury*, *1*(2), 122–138. https://doi.org/10.56003/sei.v1i2.670

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. https://doi.org/10.1080/02640414.2013.802926

Karvelytė, A., & Sipavičienė, S. (2023). Pusiausvyros ir propriocepcijos lavinimo pratimų poveikis ledo ritulio žaidėjų pusiausvyrai ir kojų traumų rizikai [Effects of balance and proprioceptive exercises on the balance of ice hockey players and the risk of lower limb injuries]. *Reabilitacijos mokslai: slauga, kineziterapija, ergoterapija*, *2*(29), 1–12. https://doi.org/10.33607/rmske.v2i29.1420

Kaziūnas, G., & Zachovajevienė, B. (2020). Proprioreceptijos ir liemens stabilumo pratimų poveikis jaunųjų futbolininkų pusiausvyrai [The effect of proprioception and core stability exercises on the balance of young football players]. *Reabilitacijos mokslai: slauga, kineziterapija, ergoterapija*, *2*(21). https://doi.org/10.33607/rmske.v2i21.828

Kilding, A. E., Tunstall, H., & Kuzmic, D. (2008). Suitability of FIFA's "The 11" training programme for young football players–Impact on physical performance. *Journal of Sports Science & Medicine*, *7*(3), 320. https://pubmed.ncbi.nlm.nih.gov/24149898/

Onofrei, R. R., & Amaricai, E. (2022). Postural balance in relation with vision and physical activity in healthy young adults. *International Journal of Environmental Research and Public Health*, *19*(9), 5021. https://doi.org/10.3390/ijerph19095021

Pardos-Mainer, E., Casajús, J. A., & Gonzalo-Skok, O. (2019). Adolescent female soccer players' soccer-specific warm-up effects on performance and inter-limb asymmetries. *Biology of Sport*, *36*(3), 199–207. https://doi.org/10.5114/biolsport.2019.85453

Parsons, J. L., Carswell, J., Nwoba, I. M., & Stenberg, H. (2019). Athlete perceptions and physical performance effects of the FIFA 11+programme in 9–11 year-old female soccer players: A cluster randomized trial. *International Journal of Sports Physical Therapy*, *14*(5), 740–752.

Shalaj, I., Tishukaj, F., Bachl, N., Tschan, H., Wessner, B., & Csapo, R. (2016). Injuries in professional male football players in Kosovo: A descriptive epidemiological study. *BMC Musculoskeletal Disorders*, *17*(1), 338. https://doi.org/10.1186/s12891-016-1202-9

Steffen, K., Bakka, H. M., Myklebust, G., & Bahr, R. (2008). Performance aspects of an injury prevention program: A ten-week intervention in adolescent female football players. *Scandinavian Journal of Medicine & Science in Sports*, *18*(5), 596–604. https://doi.org/10.1111/j.1600-0838.2007.00708.x

Steffen, K., Emery, C. A., Romiti, M., Kang, J., Bizzini, M., Dvorak, J., Finch, C. F., & Meeuwisse, W. H. (2013). High adherence to a neuromuscular injury prevention programme (FIFA 11+) improves functional balance and reduces injury risk in Canadian youth female football players: A cluster randomised trial. *British Journal of Sports Medicine*, *47*(12), 794–802. https://doi.org/10.1136/bjsports-2012-091886

Sumartiningsih, S., Risdiyanto, A., Yusof, A., Rahayu, S., Handoyo, E., Puspita, M. A., Mukarromah, S. B., Hooi, L. B., Lubis, J., & Hanief, Y. N. (2022). The FIFA 11+ for kids warm-up programme improved balance and leg muscle strength in children (9–12 years old). *Journal of Physical Education and Sport*, *22*(12), 3122–3127. https://doi.org/10.7752/jpes.2022.12395

Turner, J. A., Hartshorne, M. L., & Padua, D. A. (2024). Role of thigh muscle strength and joint kinematics in dynamic stability: Implications for Y-Balance Test performance. *Journal of Sport Rehabilitation*, *33*(8), 654–662. https://doi.org/10.1123/jsr.2024-0081

Received 2026 01 08
Accepted 2026 02 10