

COACH SUCCESSION AND NEUROMUSCULAR WARM-UP DELIVERY IN YOUTH SPORT

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ABSTRACT

To examine how youth sport clubs can retain neuromuscular warm-up instruction, delivery responsibility and session records when coaches are appointed, absent or replaced. Trial findings, coach questionnaires, interviews, exercise observations and methodological recommendations were examined according to their design, population, denominator and access limitations. The management analysis addressed coach preparation, decision authority, exercise changes and availability of session information. In the Swedish knee-injury trial, 4,564 female football players participated and the anterior cruciate ligament injury rate ratio was 0.36 (95% confidence interval 0.15–0.85). Delivery findings addressed different organisational levels: Chicago school coaches logged warm-up use at 1,425/1,773 practices; 154/178 Swedish current-coach respondents indicated absent or unknown club routines; and 21/62 invited US youth sport organisations implemented an education workshop. These quantities cannot be combined into a single adherence estimate. Coach succession requires transfer of the exercise prescription, accepted teaching responsibility and unresolved technical concerns. Session records distinguish complete, partial, omitted and unknown delivery, while athlete participation and movement quality remain separate assessments. Club management must connect coach appointments with teaching preparation, accessible instructions and responsibility for follow-up. The reviewed investigations establish exercise efficacy and delivery difficulties; they do not quantify the independent injury-prevention effect of a coach handover.

Keywords: sports management; coach succession; youth sport; neuromuscular warm-up; exercise fidelity; community sport clubs.

INTRODUCTION

Neuromuscular warm-ups depend on repeated instruction and supervision. The coach reserves practice time, selects the prescribed progression, demonstrates exercises and corrects technique. A resignation, late appointment or temporary absence changes who performs these duties. Club management therefore needs to establish who will teach the next session and what that person must receive before accepting responsibility.

The clinical justification concerns particular exercise programmes and populations. Waldén and colleagues evaluated a 15-minute warm-up, intended twice weekly, in adolescent female football (Waldén et al., 2012). Lutz and colleagues identified time constraints, insufficient support and limited awareness of programme benefits among obstacles to delivery in youth team sport (Lutz et al., 2024). Exercise efficacy does not establish the effectiveness of an appointment or handover procedure. The management task is to preserve the conditions under which the selected exercises can be taught as prescribed.

Community Australian football coaches identified staff turnover and organisational change among difficulties in programme use (McGlashan et al., 2018). Patterson and colleagues recommended annual education involving coaches, players and parents to accommodate turnover in women's and girls' Australian football (Patterson et al., 2024). Guilfoyle and colleagues' review of coach education covered 20 investigations: 17 in football and three in rugby union. Eighteen education interventions occurred at one time-point, and 12 investigations included continuing support during programme

delivery (Guilfoyle et al., 2024). These findings locate succession within an ongoing educational responsibility rather than a single preseason attendance requirement.

Programme adoption, exercise fidelity, continued use and injury outcomes answer different questions (Proctor et al., 2011; O'Brien and Finch, 2014). A club can appoint a coach without preparing that coach to teach; a team can use a programme without performing every exercise correctly. Community sport clubs also depend on interacting human, financial, infrastructural, planning and relationship resources (Doherty et al., 2014). The handover must therefore cover both teaching duties and the practical means of fulfilling them.

Middle-school sport interviews describe recruitment timing, communication difficulties and unclear adult responsibilities (Kerr et al., 2023). Their emphasis on concussion limits direct transfer to neuromuscular exercise, but the allocation of coaching and administrative duties remains relevant. In this review, *replacement* is a permanent change in the coach responsible for warm-up delivery. *Absence* is temporary unavailability without permanent reassignment. *Continuity* is retention of assigned responsibility, usable exercise instructions and recoverable session information across either event.

WHAT THE INVESTIGATIONS ESTABLISH

INJURY PREVENTION AND SESSION DELIVERY

The Swedish trial followed 230 clubs for one seven-month season. Of 4,564 players aged 12–17 years, 2,479 were in intervention clubs and 2,085 in control clubs. Anterior cruciate ligament injuries occurred in seven intervention players and 14 control players. The intention-to-treat rate ratio was 0.36 (95% confidence interval 0.15–0.85) (Waldén et al., 2012). This estimate concerns the prescribed exercise programme in adolescent female football; it cannot be assigned to a coach-transfer procedure.

The Chicago school trial illustrates the distinction between programme efficacy and repeated use: intervention coaches logged the warm-up at 1,425 of 1,773 practices, or 80.4% (LaBella et al., 2011). In the Canadian trial, 31 female youth football teams received website instruction, a coach workshop, or a workshop with additional physiotherapist supervision. Programme use at possible sessions was 73.5%, 81.3% and 85.6%, respectively; adjusted adherence differences were not statistically significant (Steffen et al., 2013). Session use does not establish full exercise dose, and a non-significant comparison does not establish equivalence between education formats. Neither investigation estimated the effect of coach replacement.

DECLINING USE AND CLUB ROUTINES

Hägglund and colleagues identified monthly reductions in team and player compliance within the Swedish season (Hägglund et al., 2013). At the three-year follow-up, 154 of 178 responding current coaches selected the category combining absence of club routines with lack of knowledge about those routines (Lindblom et al., 2014). A missing routine and a routine unknown to its intended user require different responses: the former requires an assigned process; the latter requires access and communication. The 36% response rate prevents treating these answers as a complete description of all clubs.

Only 21 of 62 organisations invited to implement Root and colleagues' workshop did so (Root et al., 2019). Appointment of a club liaison, attendance at education and teaching exercises at practice are consequently separate steps. Swedish female football coach interviews and community Australian football interviews identify time, resources, social support, programme fit and player acceptance as influences on use (McGlashan et al., 2018; Lindblom et al., 2018). In the Canadian trial subcohort, coach and player knowledge, attitudes and beliefs did not significantly predict adherence (McKay et al., 2014). Positive views therefore cannot substitute for a session record or direct observation.

EXERCISE EXECUTION AND ALTERATIONS

Fortington and colleagues assessed player execution of prevention exercises in community Australian football (Fortington et al., 2015). Ljunggren and colleagues assessed 160 exercise performances by 123 youth football players. The two physiotherapists agreed on 144 observations; Cohen's κ was 0.80 (95% confidence interval 0.71–0.89). Correct execution occurred in 69 of the 144 observations on which they agreed (Ljunggren et al., 2019). Agreement and correctness have different denominators. The checklist concerns player performance of Knee Control and cannot certify a coach's handover competence or be assumed reliable for unprepared observers.

Exercises can retain a programme name while their selection, repetition count, progression or technique changes. Documentation of an alteration requires its content, date, decision-maker, reason and relationship to required programme elements (Wiltsey Stirman et al., 2019). A successor needs these particulars to distinguish authorised instructions from

an accidental loss of content. A dated decision establishes that an alteration occurred; technical assessment is still required to determine whether the altered exercise prescription is appropriate.

ASSIGNING DUTIES AT APPOINTMENT, ABSENCE AND REPLACEMENT

FOUR DISTINGUISHABLE DISRUPTIONS

Table 1 connects each administrative disruption to the observation needed to identify it and the person responsible for action. The categories can coexist. An omitted warm-up alone does not identify the reason for omission.

TABLE 1. REQUIRED OBSERVATIONS AND ASSIGNED ACTIONS AT A COACH TRANSITION.

Disruption	Observation needed	Responsible person and action
Prepared coach absent (Doherty et al., 2014; Guilfoyle et al., 2024)	The usual coach is unavailable and no attending substitute has programme-specific preparation.	Club contact checks attendance and preparation, then arranges an instructor or prepared substitute.
Decision authority unassigned (Doherty et al., 2014; Kerr et al., 2023; Patterson et al., 2024)	No person is assigned to allocate warm-up time, arrange support or approve exercise changes.	Club committee assigns the delivery coach and the contact responsible for scheduling and resources.
Exercise change undocumented (Fortington et al., 2015; Wiltsey Stirman et al., 2019)	Observed exercises or current instructions differ from the prescription without a dated decision and reason.	Programme instructor examines the change; coach records the decision and remaining teaching questions.
Session information unavailable (Proctor et al., 2011; Wiltsey Stirman et al., 2019)	Session status, current prescription or outstanding actions cannot be recovered.	Club contact retains the unknown status and starts dated recording from the next practice.

A prepared coach may attend a practice at which the warm-up is omitted. Conversely, a lost session entry may coexist with complete exercise delivery. Absence, omission and unavailable information must therefore be recorded separately. When two disruptions occur together, each requires its own action; recruiting a substitute does not recover an undocumented change in exercise content.

Teaching responsibility belongs to the coach within that person's competence. The club contact arranges practice time, materials, record access and technical support. One person may hold both roles in a small club if both duties are assigned explicitly. Participation restrictions, rehabilitation and symptom assessment remain with the relevant qualified practitioner. Responsibility for allocating practice time does not confer authority to make clinical decisions.

DUTIES AT THE THREE EVENTS

At appointment, the club contact checks that the coach can access the current prescription, reserve the intended practice time and demonstrate programme delivery to a prepared instructor. Feedback identifies teaching concerns that require action before sole responsibility is accepted. The record retains the orientation date, the responsible instructor and any unresolved concern. Specifying the actor, action, recipient and timing makes each duty identifiable (Proctor et al., 2013).

For planned absence, the delivery coach passes the prescription and outstanding actions to an available, prepared substitute. For unexpected absence, the club contact checks whether a prepared substitute can attend and records the actual session outcome. Listing a substitute in advance does not establish attendance or delivery on the day.

At permanent replacement, the departing coach and club contact transfer the prescription, recent session entries, dated exercise alterations and unresolved teaching concerns. The successor confirms responsibility and demonstrates delivery with instructor feedback. If the departing coach is unavailable, missing history retains its unknown status and recording starts prospectively. Athletes and parents receive the name of the person who can answer questions about practice routines; clinical and safeguarding concerns continue through the club's established routes (Kerr et al., 2023).

A permanent replacement triggers orientation, while an unprepared substitute requires instruction before sole delivery. An unresolved technique concern or a change in the prescription triggers further instructor review. The reviewed articles do not establish a universally effective orientation duration or routine observation interval.

RECORDING DELIVERY WITHOUT CONFUSING ITS ASSESSMENT UNITS

PRACTICE ELIGIBILITY AND FOUR SESSION STATES

Before assessment, the delivery plan specifies the selected programme, required exercises, dose and practices at which it is intended. A held practice on that plan enters the session denominator. Cancellation is counted separately; a held practice remains eligible when its warm-up is omitted. Dated changes apply to subsequent practices and do not remove earlier omissions.

Within each assessment method, session states are mutually exclusive:

- **Complete:** all exercises and dose required for that session are established as delivered.
- **Partial:** delivery began, but at least one required exercise or dose was incomplete.
- **Omitted:** no part of the intended programme was delivered at the eligible held practice.
- **Unknown:** the available account or observation cannot determine which of the other three states occurred.

Session completion concerns content and dose. It does not establish correct movement by every athlete. An authorised alteration retains its decision date and instructor review; removal of a required exercise cannot be counted as completion of the unchanged prescription.

Each session entry identifies whether assessment used the coach's contemporaneous log, direct independent observation or a later recollection. Disagreeing accounts remain separate until their resolution is documented. An observer who could not assess a required component cannot certify completion solely from the coach's entry. An independent delivery assessment uses the observer's classification rather than replacing it with the more favourable account.

ATHLETE PARTICIPATION AND MOVEMENT QUALITY

Participation is assessed among athletes attending the practice, including late arrivals. The denominator includes attendees eligible for at least some prescribed exercise; the numerator includes those completing every component permitted for them. Athletes excused from the entire warm-up under an authorised restriction are counted separately. Partial restrictions preserve eligibility for permitted components, and partial participation retains a separate count. Unavailable attendance or restriction information leaves participation coverage undetermined.

Movement assessment examines the prescribed technique, exercise progression and teaching cues. A programme-specific checklist requires observers prepared for those exercises (Ljunggren et al., 2019; Fortington et al., 2015). Use with another programme or another observer group requires assessment of agreement. A successful demonstration during orientation provides feedback on that occasion; it does not establish the quality of all later sessions.

The club retains these entries independently of the coach's tenure. Aggregate participation counts can support routine management without including diagnoses or detailed medical histories. Identifiable attendance and authorised restrictions remain in the club's established systems, accessible to the personnel who need them. The eight entries specify what must be transferred; their usefulness and workload require testing in clubs.

CLUB RESOURCES AND ASSESSMENT OF THE TRANSFER PROCEDURE

STAFFING, INSTRUCTION AND COST

Doherty and colleagues' capacity dimensions identify five practical requirements (Doherty et al., 2014). Human resources provide an available coach and instructor. Planning assigns appointment dates, practice time and record custody. Finance covers instruction and travel. Infrastructure provides exercise space and accessible materials. External relationships provide league educators and qualified support when a club lacks those skills. A completed appointment form cannot supply a missing instructor or exercise space.

A volunteer club can assign record custody to an existing committee member and arrange instruction through a league. A club with employed staff can assign these duties to a coordinator and programme instructor. Combining administrative duties does not remove the need for technical preparation. Time and support are recurrent constraints in the injury-prevention literature (Lutz et al., 2024; Minnig et al., 2022); assessment therefore needs actual minutes spent on orientation, demonstration, observation and session entry, together with travel and instructor expenditure. Repeated entry of the same information increases workload without establishing exercise delivery.

TABLE 2. EIGHT ENTRIES RETAINED BY THE TEAM WHEN TEACHING RESPONSIBILITY CHANGES.

Entry	Required particulars	Recording rule
Assigned responsibility	Delivery coach, club contact, substitute; appointment, absence and replacement dates.	Check availability and preparation before a substitute assumes delivery.
Exercise prescription	Programme name, dated instructions, progression, dose, eligible practices and alterations.	Retain the prescription against which each session is assessed.
Practice count	Eligible held practices; separate cancellations and dated plan changes.	Retain practices with omitted warm-ups in the held-practice denominator.
Session state	Complete, partial, omitted or unknown; missing components and established reason.	Assign one state per assessment method; retain the reason separately.
Assessment method	Coach log, independent observation or recollection; date, assessor and disagreement.	Preserve each account and document any resolution.
Athlete participation	Attendees, eligible attendees, complete and partial participants, entirely excused athletes.	Count attendance at the practice, including late arrival and authorised restrictions.
Teaching assessment	Checklist, observer preparation, technique concern, responsible person and action status.	Retain unresolved concerns for the successor and instructor.
Acceptance of duties	Orientation and demonstration dates, successor's acceptance and outstanding actions.	Document the transfer without treating it as proof of future delivery.

INDEPENDENT DELIVERY ASSESSMENT

The transfer procedure has not undergone a club-level effectiveness test. Initial field evaluation needs to determine whether clubs identify real transitions, retain the eight entries and resolve outstanding teaching concerns. Coaches, club contacts and instructors can assess the clarity of duties and time required. Two prepared observers should classify the same selected sessions; a four-state cross-tabulation, raw agreement and chance-adjusted agreement with confidence intervals assess whether the recording definitions are usable.

An effectiveness comparison would randomise clubs to the transfer procedure or their usual appointment arrangements. Both groups would receive the same exercise programme and ordinary educational materials. Independent observers would use equivalent session selection, timing and assessment criteria in both groups. The transfer procedure comprises assigned duties, current instructions, demonstration with feedback, retained entries and closure of outstanding actions. The independently collected assessments must remain separate from these administrative entries.

The primary endpoint would be complete delivery of required content and dose at eligible held practices during a defined season. Record completeness, athlete participation, movement quality and staff time would be distinct endpoints. Each club would receive equal weight, with equal weighting of eligible practices within its prespecified team roster. Unequal observation probabilities require design weights. The comparison would express the difference in mean club completion proportions in percentage points with a 95% confidence interval.

Unknown session states require explicit treatment. For an equal-probability assessment sample containing C complete sessions, U unknown sessions and N eligible sessions in total, the completion proportion is bounded by

$$\frac{C}{N} \leq p_{\text{complete}} \leq \frac{C+U}{N}. \quad (1)$$

The lower bound treats every unknown session as incomplete; the upper bound treats every unknown session as complete. These limits describe uncertainty about missing classifications, in addition to sampling uncertainty. Unequal-probability samples require the corresponding weighted totals. Omitting unknown entries would require an assumption about why observation was unavailable, particularly when coach absence caused the missed visit.

Analysis would use clubs as the allocation units, adjusting for prespecified allocation strata and an independent pre-allocation measure of delivery. Teams and repeated practices cannot be treated as independent participants. A multilevel sensitivity analysis could retain teams within clubs and repeated sessions, with estimates standardised to the same equally weighted club comparison. All allocated clubs would remain in the accounting. A club with no eligible held practice has an undefined held-practice completion proportion; cancelled opportunities and discontinuation require separate description and prespecified handling.

COACH CHANGES AND INJURY SURVEILLANCE

Dates of replacement and temporary absence permit examination of interruption and subsequent delivery. Such comparisons remain secondary because workload, conflict and organisational difficulty may affect both staff changes and practice delivery. Randomising the transfer procedure does not randomise turnover; restricting analysis to replacement events can select different subsets of clubs in the two groups.

Injury incidence requires defined health problems, athlete exposure, severity and consistent ascertainment (Bahr et al., 2020). An administrative handover cannot inherit the effect estimate or sample size of an exercise trial. Planning a club comparison requires an anticipated delivery difference, between-club variation, within-club dependence, observation frequency and the proportion of unknown entries established during feasibility work. Injury outcomes need adequate exposure and precision before they can support a clinical conclusion.

INTERPRETATION AND CONCLUSION

The evidence concentrates on football, with additional school soccer, basketball, rugby and community Australian football settings. English-language selection, the 2011–2024 date restriction, purposive retrieval and unequal article access limit coverage and appraisal. Related trial articles add assessments of different outcomes without adding independent participant populations. Neither observed adherence percentages nor questionnaire answers establish the incidence of coach-transition failures across youth sport.

The investigations distinguish three club responsibilities: securing repeated exercise delivery, supporting technically correct performance and retaining instructions across personnel changes. The transfer procedure assigns those duties at appointment, absence and replacement. Its four disruption categories and eight record entries are administrative definitions, with reliability, cost and effectiveness still to be determined. Continued use is valuable only when the programme remains appropriate to the athletes and their authorised participation.

Coach succession should place the prescription, current teaching concerns and accepted delivery responsibility with the incoming coach. The club retains session accounts and provides access to instruction. Complete, partial, omitted and unknown session states preserve the difference between exercise delivery and missing information; athlete participation and movement quality preserve their own denominators. Independent observation and club-level evaluation are required to determine whether these duties maintain warm-up delivery at a feasible cost.

DECLARATIONS

CONFLICT OF INTEREST

The author declares that there are no conflicts of interest related to this study.

DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

1. Bahr R, Clarsen B, Derman W, Dvorak J, Emery CA, Finch CF, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). *Br J Sports Med*. 2020;54(7):372–389.
2. Doherty A, Misener K, Cuskelly G. Toward a multidimensional framework of capacity in community sport clubs. *Nonprofit Volunt Sect Q*. 2014;43(2 suppl):124S–142S.
3. Fortington LV, Donaldson A, Lathlean T, Young WB, Gabbe BJ, Lloyd D, et al. When 'just doing it' is not enough: assessing the fidelity of player performance of an injury prevention exercise program. *J Sci Med Sport*. 2015;18(3):272–277.

4. Guilfoyle L, Kenny IC, O'Sullivan K, Campbell MJ, Warrington GD, Glynn LG, et al. Coaches of youth field sports as delivery agents of injury prevention programmes: how are we training the trainers? A scoping review. *Br J Sports Med.* 2024;58(3):144–154.
5. Häggglund M, Atroshi I, Wagner P, Waldén M. Superior compliance with a neuromuscular training programme is associated with fewer ACL injuries and fewer acute knee injuries in female adolescent football players: secondary analysis of an RCT. *Br J Sports Med.* 2013;47(15):974–979.
6. Kerr ZY, Gildner P, Parker SK, Kostogiannes V, Callahan CE, Nedimyer AK, et al. Sport culture and communication among middle school athletes, parents, and staff: a qualitative study. *PLoS One.* 2023;18(3):e0282252.
7. LaBella CR, Huxford MR, Grissom J, Kim KY, Peng J, Christoffel KK. Effect of neuromuscular warm-up on injuries in female soccer and basketball athletes in urban public high schools: cluster randomized controlled trial. *Arch Pediatr Adolesc Med.* 2011;165(11):1033–1040.
8. Lindblom H, Waldén M, Carljford S, Häggglund M. Implementation of a neuromuscular training programme in female adolescent football: 3-year follow-up study after a randomised controlled trial. *Br J Sports Med.* 2014;48(19):1425–1430.
9. Lindblom H, Carljford S, Häggglund M. Adoption and use of an injury prevention exercise program in female football: a qualitative study among coaches. *Scand J Med Sci Sports.* 2018;28(3):1295–1303.
10. Ljunggren G, Perera NKP, Häggglund M. Inter-rater reliability in assessing exercise fidelity for the injury prevention exercise programme Knee Control in youth football players. *Sports Med Open.* 2019;5:35.
11. Lutz D, van den Berg C, Räisänen AM, Shill IJ, Kim J, Vaandering K, et al. Best practices for the dissemination and implementation of neuromuscular training injury prevention warm-ups in youth team sport: a systematic review. *Br J Sports Med.* 2024;58(11):615–625.
12. McGlashan A, Verrinder G, Verhagen E. Working towards more effective implementation, dissemination and scale-up of lower-limb injury-prevention programs: insights from community Australian football coaches. *Int J Environ Res Public Health.* 2018;15(2):351.
13. McKay CD, Steffen K, Romiti M, Finch CF, Emery CA. The effect of coach and player injury knowledge, attitudes and beliefs on adherence to the FIFA 11+ programme in female youth soccer. *Br J Sports Med.* 2014;48(17):1281–1286.
14. Minnig MC, Hawkinson L, Root HJ, Driban J, DiStefano LJ, Callahan L, et al. Barriers and facilitators to the adoption and implementation of evidence-based injury prevention training programmes: a narrative review. *BMJ Open Sport Exerc Med.* 2022;8(3):e001374.
15. O'Brien J, Finch CF. The implementation of musculoskeletal injury-prevention exercise programmes in team ball sports: a systematic review employing the RE-AIM framework. *Sports Med.* 2014;44(9):1305–1318.
16. Patterson BE, Crossley KM, Haberfield MJ, Mosler AB, Cowan SM, Lawrence J, et al. Injury prevention for women and girls playing Australian Football: programme cocreation, dissemination and early adopter coach feedback. *BMJ Open Sport Exerc Med.* 2024;10(1):e001711.
17. Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health.* 2011;38(2):65–76.
18. Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for specifying and reporting. *Implement Sci.* 2013;8:139.
19. Root HJ, Frank BS, Denegar CR, Casa DJ, Gregorio DI, Mazerolle SM, et al. Application of a preventive training program implementation framework to youth soccer and basketball organizations. *J Athl Train.* 2019;54(2):182–191.
20. Steffen K, Meeuwisse WH, Romiti M, Kang J, McKay C, Bizzini M, et al. Evaluation of how different implementation strategies of an injury prevention programme (FIFA 11+) impact team adherence and injury risk in Canadian female youth football players: a cluster-randomised trial. *Br J Sports Med.* 2013;47(8):480–487.
21. Waldén M, Atroshi I, Magnusson H, Wagner P, Häggglund M. Prevention of acute knee injuries in adolescent female football players: cluster randomised controlled trial. *BMJ.* 2012;344:e3042.
22. Wiltsey Stirman S, Baumann AA, Miller CJ. The FRAME: an expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implement Sci.* 2019;14:58.