Maintaining Physical Readiness in Soccer Players with Limited Match Exposure: Practical Approaches to Closing Accumulative Load Gaps

Joshua Rice, [1 2] **James J. Malone,** [3] **Allistair P McRobert,** [4] **Jack Ade,** [2] **Barry Drust,** [1] **Thomas E Brownlee** [4]

[1]School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Birmingham, UK
[2]Medical and Sports Science Department, Liverpool Football Club, Liverpool, UK
[3]School of Health Sciences, Liverpool Hope University, Liverpool, UK
[4]School of Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK

Elite soccer players | Physical readiness | Limited match exposure | Accumulative load gaps | Compensatory training | Small-sided games | High-intensity conditioning | Top-up sessions | High-speed running | Non-starters

Headline

Unequal match exposure is common in elite soccer squads and results in substantial variation in physical loading between players. For those with limited match participation, reduced exposure to high-intensity demands may compromise physical readiness and increase risk when match involvement changes (Di Salvo et al., 2007). Developing effective strategies to manage these load discrepancies remains an ongoing challenge for practitioners in professional soccer.

Aim

This commentary explores practical strategies to maintain physical readiness in elite soccer players with limited match exposure. Drawing on current evidence and applied practice, it examines the effectiveness of compensatory training, small-sided games, and high-intensity conditioning to reduce accumulative load discrepancies between starters and non-starters, while highlighting key limitations and future directions for practitioners working in high-performance environments.

Introduction

Soccer is an invasion-based, intermittent sport characterised by repeated high-intensity actions interspersed with periods of low-intensity activity (Drust et al., 2000). The physical demands of match play are highly variable, influenced by tactical role, playing position, and contextual factors, resulting in substantial between-player differences in locomotor and physiological load (Di Salvo et al., 2007). Within modern professional squads, these differences are further amplified by variation in match exposure, particularly between starters, fringe players, and non-starters.

Squad sizes in elite soccer commonly exceed 25 players, creating ongoing challenges for practitioners tasked with maintaining physical readiness across the entire group. While match exposure represents the most potent stimulus for physical development and maintenance, not all players consistently experience this stimulus. For players completing full matches, match day typically constitutes the most demanding session of the weekly microcycle, particularly for high-speed running (HSR) and sprint distance (SPR) (Di Salvo et al., 2007). During congested fixture periods, match play may account for more than 95% of a squad's weekly HSR and SPR exposure (Anderson et al., 2015). In contrast, partial-match players and non-starters often accumulate substantially lower weekly external and internal loads.

If unaddressed, these discrepancies may lead to detraining effects, reduced physical readiness, and potentially an elevated risk of injury when players are suddenly required to perform at match intensity. Figure 1 illustrates typical weekly accumulative load differences between starters, fringe players, and non-starters when additional conditioning is not implemented. Even when squad rotation is employed to manage fatigue and recovery (Carling et al., 2015), players with infrequent match exposure consistently receive lower overall physical stimuli.

To mitigate these issues, practitioners commonly employ 'top-up' or compensatory conditioning sessions, delivered either immediately post-match or during the early part of the training week (Buchheit et al., 2019; Buckthorpe et al., 2019). The primary aim of these sessions is to compensate for deficits in match-derived physical load and maintain physical readiness across the squad (Hills et al., 2020). However, practical constraints, including player availability, recovery considerations, and the potential requirement for players to participate in upcoming matches, complicate the design and implementation of these interventions.

This expert commentary synthesises current evidence and applied practice to address four key questions: (1) what methods are most effective for maintaining and developing physical fitness in players with limited match exposure; (2) how effective are current top-up strategies in closing accumulative load gaps; (3) how should interventions be implemented when current strategies are insufficient; and (4) what limitations and future directions should guide ongoing practice and research.

Methods to Maintain and Develop Fitness in Players with Limited Match Exposure

Despite growing interest in whole-squad physical management, there remains no consensus on the optimal methods to maintain fitness in players who do not regularly experience match demands. Some practitioners prioritise external load metrics, such as total distance or HSR, while others emphasise internal load measures, including heart rate–based indices or perceived exertion. In practice, a combination of internal and external measures is often used to inform decision-making.

A key consideration is identifying appropriate time points within the microcycle to implement additional conditioning without compromising readiness for potential match selection. Once timing is established, practitioners can select training modalities that target the specific physical qualities underrepresented by reduced match exposure.

Small-sided games (SSGs) are widely used to replicate and manipulate match-related demands through adjustments in player number, pitch dimensions, and rules (Owen et al., 2004;

Lacome et al., 2016). Altering relative pitch area per player is particularly influential in determining the physiological and mechanical outputs of SSGs. Smaller formats (e.g., 1v1 to 4v4) typically elicit higher cardiovascular strain, metabolic load, and perceived exertion, while larger formats (>9v9) better approximate match-related running demands, including HSR exposure (Katis & Kellis, 2009; Dellal et al., 2011).

Heart rate responses during SSGs commonly range from approximately 90% of maximal heart rate in very small formats to around 81% in large-sided games, with progressive reductions as player numbers increase (Little & Williams, 2007; Dellal et al., 2011). Consequently, SSG design should be guided by the intended training outcome. For non-starters, SSGs may be integrated at the end of MD+1 or MD+2 sessions once starters have completed recovery, or during MD-4 or MD-3 in one-match microcycles when starters follow reduced training content. However, a common constraint is the limited number of players available, often fewer than ten, which restricts the feasibility of larger-sided formats.

Isolated running-based conditioning represents another commonly used method to address fitness deficits. Traditional continuous running has historically been employed to improve aerobic capacity, but contemporary research highlights the importance of specificity and intensity modulation (Buchheit & Laursen, 2003). High-intensity training (HIT), defined as repeated short-to-long bouts of high-intensity exercise interspersed with recovery periods (Billat et al., 2001), provides a framework for targeted physiological overload.

HIT protocols can be prescribed using various approaches, including heart rate, perceived exertion, maximal aerobic speed, or anaerobic speed reserve. Manipulation of work and recovery durations, interval number, and set structure allows practitioners to target specific physiological responses (Buchheit & Laursen, 2013). Table 1 outlines key variables available for HIT prescription and their expected effects. Game-based HIT derivatives, such as intermittent running at maximal aerobic speed interspersed with passive recovery (Lacome et al., 2016), may provide a practical compromise between physiological specificity and ecological validity.

Table 1. High Intensity training variables adapted from Buchheit and Laursen, 2013

(1) Intensity of work intervals
(2) Duration of work intervals
(3) Duration of rest intervals
(4) Intensity of rest interval – passive (no activity) or active (low intensity activity)
(5) Number of work-to-rest intervals
(6) Number of series
(7) Exercise selection

Effectiveness of Current Top-Up Strategies

Evidence suggests that standard team training sessions may not consistently deliver match-equivalent external loads, particularly for HSR and metabolic demands (Morgans et al., 2018; Gualtieri et al., 2020). As a result, top-up sessions are frequently implemented to reduce acute discrepancies between starters and non-starters. However, the effectiveness of these sessions in fully closing load gaps appears limited.

Hills et al. (2020) reported that typical post-match top-ups elicited approximately 400 m of HSR and 30 m of sprint distance, representing roughly 25–50% of match demands depending on position. While these sessions partially offset deficits, they are unlikely to fully replicate the cumulative stimulus of competitive match play. Time constraints, player fatigue, and logistical challenges often necessitate brief, running-based interventions rather than comprehensive training sessions.

Where feasible, more structured sessions delivered the day after matches, incorporating both SSGs and HIT-based running, may provide a more substantial stimulus (Lacome et al., 2018). Integrating technical and tactical elements into these sessions may also enhance player engagement and contextual relevance, particularly when led collaboratively by performance and coaching staff. Nonetheless, situational constraints, such as away fixtures or limited pitch access, may require practitioners to rely on isolated running to deliver essential load.

Implementing More Effective Interventions

When current top-up strategies fail to sufficiently address load discrepancies, greater individualisation and creativity are required. Training prescription should account for each player's cumulative exposure across the training cycle, not solely acute weekly deficits. Match-derived load remains a dominant contributor to overall stimulus, reinforcing the importance of compensatory strategies for non-starters.

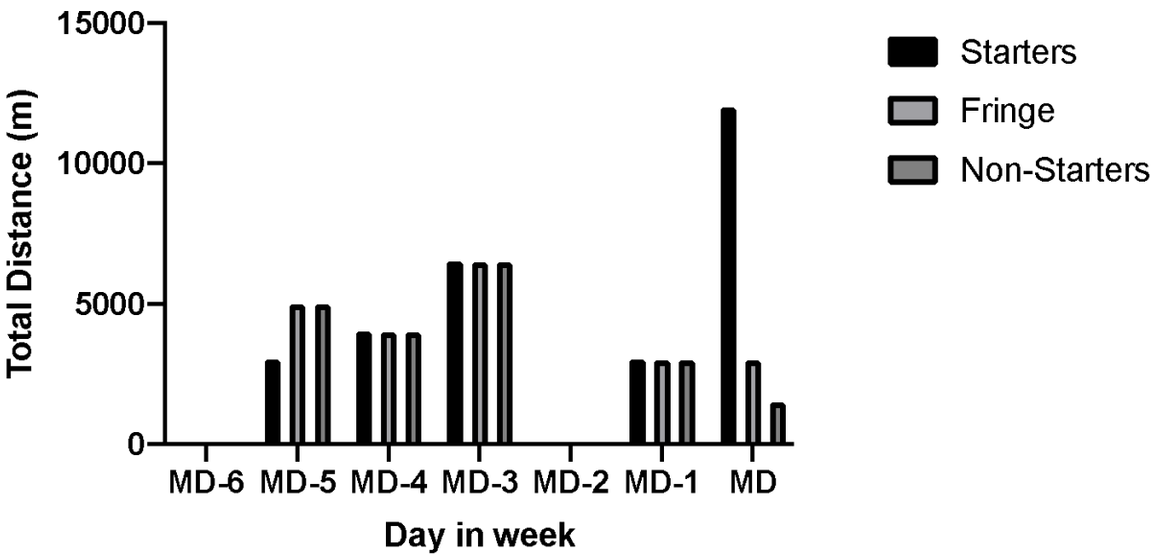
Recent applied research has used peak match demands to inform conditioning design, aiming to replicate the most intense passages of play rather than average match values (Buchheit et al., 2013; Ade et al., 2014). This approach allows practitioners to target high-intensity running while preserving technical and tactical relevance. Such methods may improve player buy-in and better prepare individuals for the contextual demands of match play.

Evidence from other team sports provides insight into the feasibility of short-term, in-season conditioning interventions. For example, Dobbin et al. (2019) demonstrated that two weeks of sprint interval training in rugby improved physical characteristics and submaximal performance without compromising wellbeing. While direct translation to soccer requires caution, these findings support the inclusion of targeted, high-intensity micro-doses within congested schedules.

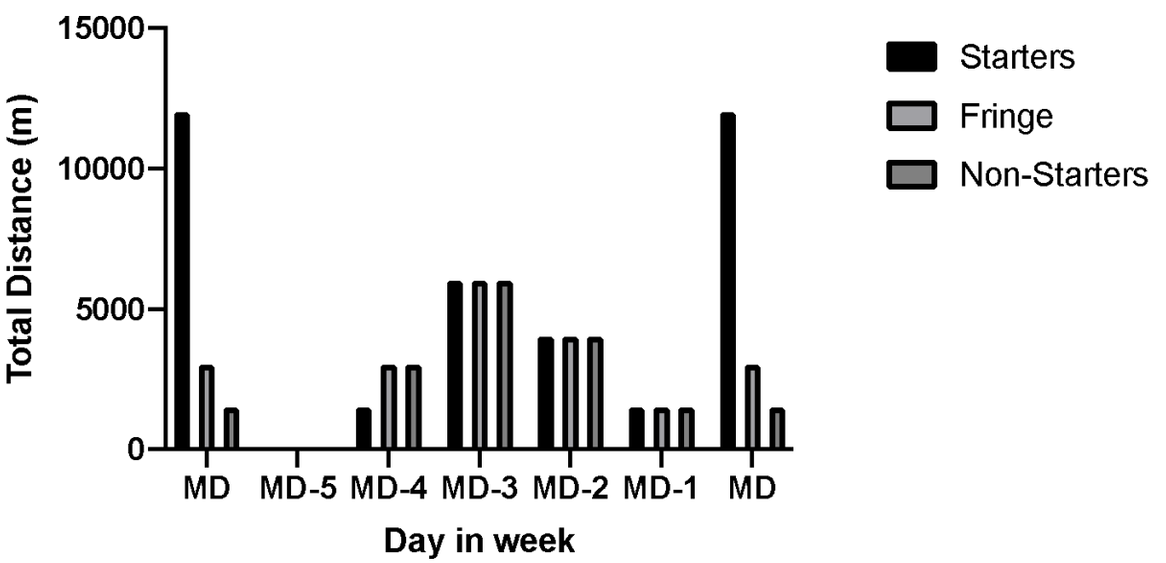
Importantly, practitioners must recognise the trade-off between inducing adaptation and managing cumulative load. While targeted interventions may enhance specific qualities, they may not fully prepare players for repeated high-volume HSR demands over consecutive matches. As such, a balanced, periodised approach is required, with top-up sessions viewed as complementary rather than equivalent replacements for match exposure.

Friendly matches, either against external opposition or in-house squads, may provide an additional solution. Although typically less intense than competitive fixtures (Castellano et al., 2013), they offer sport-specific movement patterns and decision-making demands that may exceed those achieved through SSGs or running alone.

(a)


15000
10000
5000
0
Total Distance (m)
MD-6 MD-5 MD-4 MD-3 MD-2 MD-1 MD
Day in week
Starters
Fringe
Non-Starters

(b)


15000
10000
5000
0
Total Distance (m)
MD MD-5 MD-4 MD-3 MD-2 MD-1 MD
Day in week
Starters
Fringe
Non-Starters

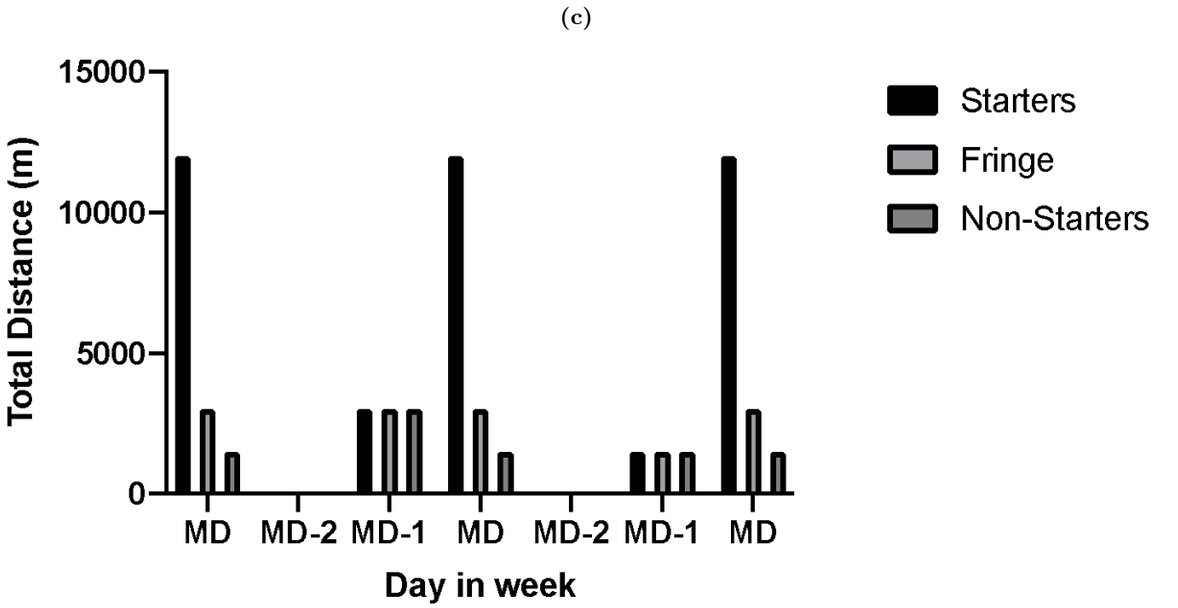


Fig. 1. **a, b & c adapted from Quantification of a typical one, two- and three-day game week by starting status (Anderson et al., 2015). Playing squad average total distance in training sessions during three different 7-day testing periods. Figure 1a represents the typical structure of one game a week. Figure 1b represents the typical structure of two games a week. Figure 1c represents the typical structure of three games a week.**

Practical Applications

- Match play remains the primary driver of physical stimulus; compensatory strategies should aim to reduce, not eliminate, discrepancies in load.
- Large-sided SSGs (>165 m^2 per player) are preferable for HSR exposure, but limited player numbers may necessitate combined SSG and HIT approaches.
- Individualisation of top-up sessions based on recent load exposure is essential; blanket squad prescriptions are insufficient.
- Integration of technical content within conditioning sessions may improve contextual relevance and player engagement.
- GPS and heart rate monitoring should be used to evaluate whether intended stimuli are achieved.

Limitations and Future Directions

- Contextual factors such as fixture congestion, match location, and psychological state influence the feasibility and effectiveness of top-up sessions.
- Limited player availability constrains SSG design and may necessitate isolated conditioning approaches.
- Greater research is needed to quantify the long-term effects of compensatory conditioning on physical readiness and injury risk.
- Future studies should explore optimal periodisation strategies that balance adaptation and availability in players with limited match exposure.

Conclusions

Variation in match exposure within elite soccer squads necessitates individualised approaches to physical preparation. While current top-up strategies can partially address load discrepancies, they rarely replicate the full stimulus of competitive match play. By integrating evidence-informed SSG and HIT methodologies, and tailoring interventions to individual needs, practitioners can better maintain physical readiness across the squad. Continued applied research is required to refine these strategies and support evidence-based decision-making in high-performance soccer environments.

Acknowledgements

The lead author acknowledges the funding provided by Liverpool Football Club to financially support his studies.

Declaration of Interest

The authors declare that they have no conflict of interest in preparation of the present systematic review.

Ethical approval Information

Not applicable.

References

1. Drust B, Reilly T, Cable NT. Physiological responses to soccer match-play. J Sports Sci. 2000;18(9): 665–674.

2. Di Salvo V, Gregson W, Atkinson G, Tordoff P, Drust B. Analysis of high intensity activity in premier league soccer. Int J Sports Med. 2007;28(3): 222–228.

3. Anderson L, Orme P, Naughton R, Close GL, Morgans R, Drust B, Morton JP. Quantification of the sprinting profile of elite English Premier League soccer players. J Strength Cond Res. 2015;29(9): 2459–2466.

4. Carling C, McCall A, Le Gall F, Dupont G. The impact of squad rotation on physical performance during elite soccer competition. J Sports Sci. 2015;33(12): 1259–1267.

5. Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. Sports Med. 2013;43(5): 313–338.

6. Bucheit M, Simpson BM, Kellmann M, et al. Strategies to reduce training load discrepancies in elite soccer players. Int J Sports Physiol Perform. 2019;14(7): 904–912.

7. Buckthorpe M, Roi GS, Morris JG. Conditioning and top-up training for sub-elite soccer players. J Sports Sci Med. 2019;18(4): 703–712.

8. Hills SP, Montgomery PG, Foskett A. Top-up sessions: bridging the gap in physical load for non-starters in soccer. J Sports Sci. 2020;38(12): 1425–1434.

9. Owen A, Wong DP, McKenna MJ, Dellal A, Chamari K. Physical and technical demands of small-sided games in soccer. Int J Sports Med. 2004;25(8): 540–546.

10. Lacome M, Simpson BM, Cholley Y, et al. Manipulation of pitch dimensions in small-sided soccer games: physiological responses. J Sports Sci. 2016;34(14): 1295–1303.

11. Gregson W, Drust B, Weston M, et al. Physiological and movement responses to different small-sided game formats in professional soccer. J Sports Sci. 2010;28(12): 1235–1242.

12. Little T, Williams AG. Specificity of acceleration, maximum speed, and repeated sprint performance in professional soccer players. J Strength Cond Res. 2007;21(1): 96–103.

13. Katis A, Kellis E. Effects of small-sided games on physical and physiological parameters in soccer. J Sports Sci Med. 2009;8(3): 374–380.

14. Dellal A, Chamari K, Wong DP, et al. Comparison of physical and technical performance in different small-sided games in elite soccer players. Int J Sports Med. 2011;32(6): 452–459.

15. Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. Sports Med. 2003;33(7): 213–222.

16. Billat V, Demarle A, Slawinski J, et al. Physical and physiological characteristics of elite long-distance runners.J Sports Med Phys Fitness. 2001;41(3): 249–258.

17. Laursen PB, Jenkins DG. The scientific basis for high-intensity interval training. Sports Med. 2002;32(1): 53–73.

18. Morgans R, Anderson L, Drust B, Morton JP. Quantifying the demands of elite soccer players during congested fixture periods. Int J Sports Physiol Perform. 2018;13(9): 1120–1126.

19. Gualtieri T, Simbula G, Castagna C. Training load and recovery in elite soccer players: bridging practice and science. J Strength Cond Res. 2020;34(11): 3120–3129.

20. Bucheit M, Simpson BM, Bishop D, et al. Soccer-specific running drills based on most demanding passages of play. J Sports Sci. 2013;31(15): 1651–1658.

21. Ade JD, Fitzpatrick J, Bradley PS. High-intensity running in elite soccer: a review of player tracking data. Int J Sports Physiol Perform. 2014;9(2): 189–198.

22. Dobbin N, Hart NH, Cormack SJ. Sprint interval training in-season: effects on rugby performance and recovery. J Strength Cond Res. 2019;33(8): 2204–2212.

23. Castellano J, Casamichana D, Dellal A. Influence of friendly matches on physical activity in soccer players. J Hum Kinet. 2013;38: 121–130.