

Putting sport injury prevention into practice: a qualitative study in a small Western European high-income country

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To cite: Aguilaniu A, Tooth C, Benoit-Piau J, *et al.* Putting sport injury prevention into practice: a qualitative study in a small Western European high-income country. *BMJ Open Sport & Exercise Medicine* 2026;**12**:e003318. doi:10.1136/bmjsem-2026-003318

Accepted 8 June 2026



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ABSTRACT

Despite strong scientific evidence supporting sports injury prevention, implementation in real-world sport settings remains limited. Understanding how prevention is perceived and practised by those directly involved in sport is essential to ensure effective implementation. This qualitative study explored how injury prevention is perceived, practised and implemented within the sport ecosystem of a small Western European high-income country (Luxembourg). Semi-structured interviews were carried out across the Luxembourgish sport ecosystem, including athletes, coaches, healthcare professionals and institutional representatives. Interviews were conducted until data saturation was reached. Data were analysed inductively following grounded theory principles using ATLAS.ti, with open, axial and selective coding to develop core dimensions grounded in participants' experiences.

12 participants acknowledged the importance of injury prevention and shared a strong commitment to athlete health. However, prevention was often perceived as reactive, medicalised or disconnected from performance objectives, which limited sustained engagement. Participants emphasised the need to reframe prevention as a performance-enhancing and integral component of training rather than an additional constraint. Three key facilitators for effective implementation emerged: (1) clear and coordinated communication between stakeholders and institutions, (2) early integration of injury prevention in youth sport through engaging and age-appropriate approaches and (3) structured education and long-term support for coaches, who were identified as central gatekeepers of daily practice. Although Luxembourg's small size and close-knit networks were seen as opportunities for collaboration, fragmented structures and inconsistent communication currently hinder coherent implementation.

Luxembourg offers a favourable context to embed injury prevention within sport culture, yet greater system-level coordination is required. Reframing prevention around performance, strengthening coach education, promoting early engagement and improving cross-institutional communication may enhance adherence and sustainability. These findings provide practical insights for other sport systems seeking to translate evidence-based injury prevention into effective field practice.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Sports injuries are common and associated with long-term health, functional and economic consequences.
- ⇒ Injury prevention programmes are effective but inconsistently implemented in real-world sport settings.
- ⇒ Implementation frameworks emphasise the role of context and stakeholder engagement in effective injury prevention.

WHAT THIS STUDY ADDS

- ⇒ In small, high-income sport systems, injury prevention is constrained more by fragmentation and weak implementation support than by lack of evidence.
- ⇒ Athlete-centred prevention requires not only education, but also structured communication and environments that enable athlete voice and progressive autonomy.
- ⇒ A system-level perspective shows that implementation support, early engagement and coach facilitation operate as interdependent drivers of sustainable prevention practice.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Co-creation involving athletes, coaches, healthcare professionals and institutions may enhance the relevance and sustainability of injury prevention strategies.
- ⇒ Shared ownership, ongoing implementation support and feedback mechanisms may help bridge the gap between evidence and practice in high-income sport systems.
- ⇒ Policies fostering integrated governance, cross-sector communication and long-term coach support could promote coordinated, athlete-centred prevention.

INTRODUCTION

Physical activity contributes significantly to long-term health and the reduction of non-communicable chronic diseases.^{1–3} However, increased participation in sport and exercise may expose individuals to a higher risk of musculoskeletal injuries.⁴ These injuries

often require prolonged rehabilitation, generate substantial societal and economic costs, and may disrupt athletic careers or reduce long-term engagement in physical activity.^{5–7} In addition, some injuries, such as anterior cruciate ligament tears, are linked to an increased risk of osteoarthritis and long-term functional limitations.⁸ In Luxembourg, a small Western European country, sports-related injuries have been consistently reported over the past two decades, highlighting the need to promote injury prevention alongside physical activity.^{9–11}

Although evidence-based interventions such as neuromuscular training and structured warm-up programmes reduce injury risk,^{12–14} their implementation in real-world settings remains limited.¹⁵ To address this gap between research and practice, implementation frameworks such as the Seven-Step Approach have been developed to guide injury prevention programmes, emphasising administrative support, interdisciplinary collaboration and context-sensitive implementation.^{16–18} Understanding how stakeholders perceive injury and prevention, what motivates their engagement and which barriers hinder implementation is essential for sustainable prevention efforts.^{19 20}

Despite the availability of effective prevention strategies, injury rates remain high, underscoring a persistent disconnect between scientific recommendations and field-based practice. Qualitative research is well suited to explore this gap by capturing the social, cultural and behavioural factors shaping prevention in real-life contexts.^{21 22} Incorporating stakeholders' lived experiences has been shown to enhance the relevance and sustainability of injury prevention initiatives.^{23 24}

This study explores how injury prevention is perceived and practiced in Luxembourg, a high-income country with strong scientific and institutional resources but persistent challenges in translating evidence into routine sport practice. By examining the experiences of athletes, coaches, healthcare professionals and representatives of sport-related institutions, the study aims to identify context-specific barriers and facilitators to support the development of more integrated and sustainable injury prevention strategies.

METHODS

Study design

This exploratory qualitative study adopted Straussian grounded theory principles and used these pragmatically to support inductive analysis. The study sought to construct an empirically grounded conceptual framework explaining how stakeholders perceive and implement injury prevention within the Luxembourg sport ecosystem.^{25 26} Semi-structured interviews were used to capture participants' lived experiences and meanings.^{27 28}

An interview guide was developed based on existing literature^{29 30} and pilot-tested by members of the team (AA and CT). Then, research team meetings (all authors) were held to iteratively improve the interview

guide. The team included both academic and practitioner co-authors, some of whom had prior experience in developing semi-structured interview guides for sport-related and health-related qualitative studies. All guides followed a common structure, covering (1) role and background in sport; (2) definitions and experiences of health and injury; (3) personal or observed injury cases (eg, symptoms, management, return to play); (4) perceptions and practices of injury prevention; (5) barriers and enablers to prevention; (6) roles and responsibilities in injury prevention and (7) suggestions for improving injury prevention systems. Pilot testing led to minor refinements in question wording to improve clarity and relevance across stakeholder groups, while the overall structure remained unchanged.

Participants

Participants were recruited using convenience sampling to ensure representation across four stakeholder groups: (1) athletes, (2) coaches, (3) healthcare professionals and (4) representatives of sport-related institutions (clubs, federations, schools). Recruitment aimed to capture variation across stakeholder group, organisational roles and sport-related experiences.

Recruitment was conducted through the dissemination of a flyer within the Luxembourg sports ecosystem, including sport organisations such as federations. Eligible participants were voluntary adults actively involved in the Luxembourg sport ecosystem. No individuals who were approached declined participation after receiving information about the study, and no participants withdrew after providing consent. All participants provided written informed consent prior to the interviews.

Data collection

All interviews were conducted by a female physiotherapist and PhD researcher with experience in qualitative research (AA), using a one-on-one format with only the participant and the researcher present. Interviews took place at the most convenient location for the participants (eg, their workplace or host in an office of the research team) between September 2024 and February 2025. No prior relationship existed between the interviewer and the study participants. Before the interviews, participants were informed about the researcher's professional background as a physiotherapist and PhD researcher, the academic purpose of the study, and the voluntary nature of their participation.

The research team included researchers and practitioners with backgrounds in physiotherapy, sport science and injury prevention. We acknowledge that this professional proximity may have shaped both data interpretation and sensitivity to prevention-related issues. To support reflexivity, coding decisions and emerging interpretations were discussed within the team, including across disciplinary perspectives, in order to challenge assumptions and refine category development.

All interviews were audio-recorded; no field notes were taken during sessions. Interviews lasted on average 45 min (± 8.8 min), and none of them were repeated. Transcripts were not returned to participants for review or correction. The transcriptions were initially produced using the AI-based software (Descript.com) and subsequently checked manually to ensure their accuracy. Audio files and transcripts were stored securely and handled in accordance with institutional data protection procedures. All transcripts were anonymized to safeguard confidentiality and privacy in compliance with data protection regulations.

Data analysis

Data were analysed inductively following the principles of Straussian grounded theory.^{25, 26} Transcripts were imported into ATLAS.ti (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany), and open coding was conducted by the first author to identify key actions, processes, and perceptions.

To ensure consistency and reflexivity in the analytical process, AA, CT and JB-P independently reviewed the full coding of one complete transcript. A dedicated meeting was then held to compare interpretations, clarify code definitions, and reach consensus on coding logic and category boundaries.

Subsequently, focused coding was used to group similar codes into broader conceptual categories. A process of constant comparison was applied within and across interviews to identify patterns, variations, and relationships among emerging categories. Memo-writing throughout the process helped refine interpretative depth and support theory construction.

In total, 499 initial codes were generated inductively and organised within ATLAS.ti. These first-level codes captured participants' words and meanings and were

grouped into higher-order categories reflecting both experiential states and system-related aspects of injury prevention. These categories included *being injured* (20 codes), *being healthy* (29), *dealing with pain* (20), *seeking one's limit* (28), *managing load* (50), *awareness of prevention* (119), *resources for prevention* (49), *Luxembourg characteristics* (34), *communication* (105), *early education* (53) and *coach support* (33).

Axial coding involved constant comparison across initial codes and categories to identify relationships, conditions, and consequences shaping injury prevention practices. This analytic phase enabled the research team to connect individual experiences with broader organisational and system dynamics, including how injury prevention is framed, how responsibilities are distributed across the sport system, and which contextual conditions support or hinder sustainable implementation.

Selective coding was used to integrate the most theoretically saturated categories and codes into three main dimensions that structure the Results section. Categories related to awareness of prevention, resources for prevention, and managing load informed the dimension 'Reframing injury prevention: From reactive perceptions to integrated practice'. Codes associated with Luxembourg characteristics and communication contributed to 'Fragmented efforts despite proximity: Specific features of the Luxembourg context'. Finally, categories focusing on communication, early education and coach support converged into the dimension 'Building the foundations for effective injury prevention'.

To illustrate this final dimension, an empirical grounded conceptual framework (figure 1) was developed by selecting the most explicit and theoretically saturated codes within the categories of communication, early education, and coach support. The figure

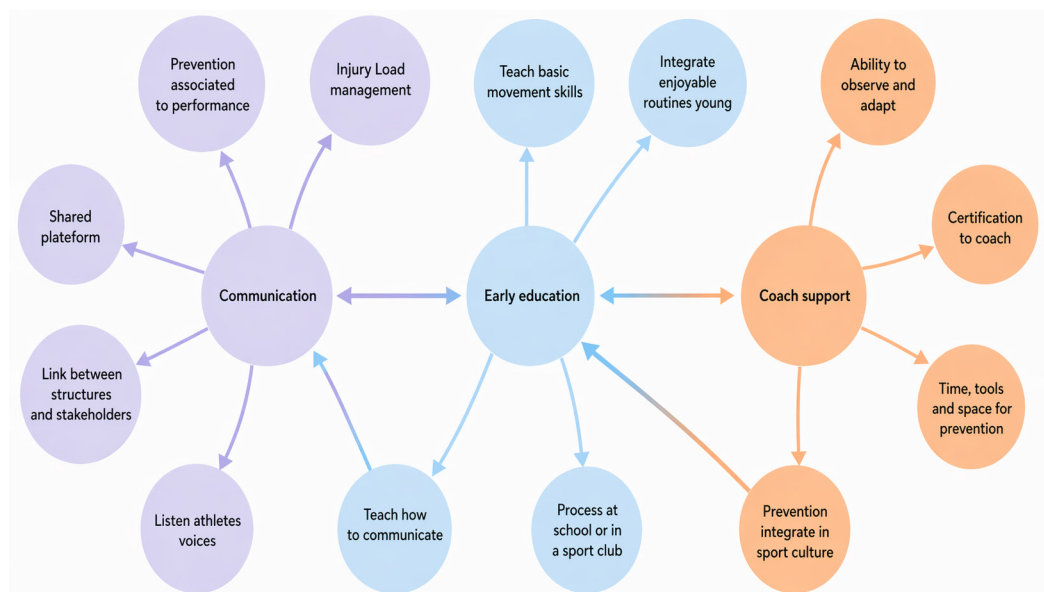


Figure 1 Building foundations for effective injury prevention.

Table 1 Participants characteristics

Categories	n
Total number of participants	12
Gender	
Women	4
Men	8
Age	
<29	2
30–39	3
40–49	4
>50	3
Primary professional role	
Healthcare professional (H)	4
Coach (C)	2
Representatives of sport-related institutions (R)	3
Athlete (A)	3
n is the number of participants associated with each categories.	

synthesises key implementation levers reported by participants and illustrates how communication, education, and coach support interact to sustain injury prevention efforts across the sport ecosystem.

Theoretical saturation was assessed through an iterative constant comparative process. Saturation was considered achieved when successive interviews no longer generated new codes and when existing categories were consistently reinforced rather than expanded.³¹ In addition, saturation was examined across participant profiles, as similar categories and relationships emerged among athletes, coaches, healthcare professionals and institutional representatives. At this stage, the data contributed to confirming the properties and dimensions of established categories rather than generating novel conceptual insights.

RESULTS

Participants

To ensure confidentiality, pseudonyms (Pierre, Julien, Zoé, Justine, David, Raphaël, Milo, Mika, Emy, Peter, Amélie and Robert) were assigned to participants when reporting quotes. Table 1 provides a description of the interview sample. Participants were classified according to their primary professional role; however, it is important to note that some individuals held overlapping roles. For example, coaches (C) who were also healthcare professionals (H) or institutional representatives (R) with prior experience as athletes (A) or coaches. This diversity of perspectives allowed for a comprehensive understanding of the field, enriched by insights from both past and current experiences. The quotations presented are illustrative of broader patterns identified across the dataset.

In participants' accounts, injury prevention was often understood as actions aimed at avoiding injury, whereas

performance enhancement referred to improving training quality, readiness, or availability, and health protection encompassed broader efforts to sustain long-term well-being and continued sport participation.

Reframing injury prevention: from reactive perceptions to integrated practice

Although all participants recognised the importance of injury prevention, many expressed discomfort with how the concept is framed and communicated. The term 'prevention' was often perceived as negative, evoking fear rather than empowerment. As Robert (R) put it, *"What is prevention? It's negative [...] Inherent in the term prevention is fear. What are we preventing? An accident. Death."* Similarly, Zoé (H) noted that *"It's always something that physiotherapists administer, they put it there just because they feel they should, not because anyone is truly invested in it."*

Despite this initial discomfort, participants agreed on the value of scientifically supported preventive practices. Amélie (H) emphasised the need to act on evidence: *"Even scientifically, it's proven that doing some foam rolling or stretching is beneficial. So if it's proven and it's good, I think we should just do it."* Rather than an add-on to training routine, Pierre (R) advocated for prevention to be seamlessly embedded: *"prevention shouldn't be something added on top, but rather a continuous part of the process."*

This shift from a reactive to a proactive mindset was supported by efforts to make injury prevention part of the daily practice. Yet, many professionals noted that athletes often seek help only after symptoms appear. As Zoé (H) remarked, *"Many come only when it already hurts."* This reactive behaviour reflects a broader cultural norm where prevention is not yet integrated into everyday training routines. Temporary engagement with prevention programmes was also a concern: *"They use it for a few months, then they feel better and forget. And then they come back again when something happens,"* she explained. These cycles underscore the need for consistent institutional support and long-term strategies.

Crucially, the role of the coach emerged as central to turning prevention into sustained practice. As Amélie (H) emphasised that *"the coach is on the front line, if they don't care, nothing happens."* Coaches were described as gatekeepers who determine whether preventive strategies are consistently applied. Zoé (H) agreed *"the coach is the key for implementation."* However, participants also recognised their own responsibilities. *"We need to do a better job communicating the benefits, not as injury prevention but as performance enhancement,"* Zoé (H) acknowledged. This reframing may improve buy-in from both athletes and staff, helping to foster a culture where prevention is seen as enhancing performance rather than merely avoiding injury. This perspective was predominantly expressed by healthcare professionals and institutional representatives, and appeared less prominently in the accounts of coaches and athletes, which may reflect challenges in recognising or prioritising its importance within everyday practice.

Fragmented efforts despite proximity: specific features of the Luxembourg context

Injury prevention in Luxembourg presents a unique paradox. While the country's small size and interconnected networks could facilitate collaboration, interviews revealed a notable lack of coordination between key institutions. Amélie (H) highlighted this fragmentation *"Each world functions in its own silo. There's no system that connects them."* Similarly, Robert (R) pointed to duplicated efforts due to the absence of a central communication system *"there was no link between educational institution and federations. We sometimes taught the same thing twice in different places without knowing the other had done it."*

While national efforts are made to support high-level athletes through dedicated programmes and specialised settings, interviewees described gaps in continuity and oversight. As Zoé (H) explained, *"We see high-level athletes in structured settings, but for most, there's no unified follow-up. It depends on who's in charge and how well they communicate."* According to Mika (H), national coordination tends to focus on major events, leaving daily injury prevention up to local staff: *"They step in for big competitions, but day-to-day prevention is left to others, and that creates gaps."*

Participants also noted a lack of feedback mechanisms between institutions, clubs, and medical staff. Peter (R) expressed the need for better systems, *"Everyone works in their own bubble. We need a system to share info on injuries, loads, moods."* At the same time, inconsistent messages given to the same athlete across settings further complicate prevention efforts. Robert (R) warned: *"An athlete may receive different guidance from a school program, their club, and the federation, and nobody checks if it fits together."*

Finally, Luxembourg's multilingual and multicultural context can be an additional barrier. Communication across roles, institutions, and languages can dilute or delay the implementation of shared prevention strategies. As Emy (R) observed earlier in her interview: *"Sometimes it's not that people don't want to do prevention. It's that they don't speak the same language, literally or professionally."*

These observations were consistently reported across stakeholder groups, including athletes and coaches, although healthcare and institutional representative participants more often emphasised structural and organisational dimensions of fragmentation. These examples illustrate how Luxembourg's specific structural and cultural context, marked by overlapping responsibilities, limited coordination and linguistic diversity, can hinder the development of coherent and sustained injury prevention strategies, despite good intentions and existing resources.

Building the foundations for effective injury prevention: communication, early education and coach support

From the interviews, three key conditions emerged as essential to foster effective injury prevention within the Luxembourg sport ecosystem. These conditions, illustrated in [figure 1](#), form a conceptual framework grounded in the perspectives and lived experiences of stakeholders.

The three pillars are (1) integrated and coordinated communication among actors, (2) early education and engagement in youth sport and (3) sustained support and training for coaches. Surrounding these pillars are practical examples drawn directly from participants' observations of the field.

First, a lack of coordination among stakeholders emerged as a major barrier to effective injury prevention. Participants described an environment in which information related to injuries, training load, fatigue and recovery is rarely shared across roles or institutions. This fragmentation undermines trust and continuity of care. Milo (A) explained that *"they (elite athletes) don't dare say they're tired, they're afraid to lose their spot,"* while Julien (H) added, *"Young athletes don't feel they can speak. We don't teach them how."* Amélie (H) summarised this situation by noting that: *"Each world functions in its own silo, there's no system that connects them."* Robert (R) provided a practical example of this lack of coordination: *"There was no link between a national institute of physical activity/sport and the federation—we taught the same thing twice."* These insights point to the need for structured communication channels and shared decision-making across systems. This perspective was particularly prominent in the accounts of healthcare and institutional representative participants, although it was also echoed by athletes and coaches.

Second, participants emphasised the importance of introducing injury prevention early in an athlete's development. Zoé (H) explained that *"If it's already integrated in youth, and young athletes understand why they're doing it and what the long-term benefits are, it can have a positive impact on their health later on."* Robert (R) illustrated this through basic motor learning: *"If a kid learns how to fall, land, roll early on, he'll already prevent injuries before they start competing."* To sustain engagement, strategies must be age-appropriate and enjoyable. Emy (R) suggested that *"For kids, prevention has to be playful, like obstacle courses or coordination games."* Mika (H) added: *"If you make it boring, they'll skip it. But if you gamify it, they love it, even if they don't realize it's prevention."* Athletes' involvement was also seen as essential. Julien (H) stressed that *"Young players must feel safe to say, 'I need rest' without fear of losing their spot."*

Third, the role of the coach was consistently highlighted as central to the implementation of injury prevention strategies. Coaches were described as the primary link between scientific knowledge and daily practice. David (C) observed that *"Each coach has their own idea. Some do it, some don't. Some call it warm-up, some don't know what it is."* Participants highlighted the need for better education and structural support for coaches. *"Give coaches time, tools, and space, otherwise they'll just repeat drills,"* urged Peter (R). Reframing prevention as part of performance rather than an additional burden was considered essential. Robert (R) noted that *"if coaches see prevention as performance, not extra work, it'll be taken seriously,"* while also emphasising that existing training modules *"must go deeper, not just exercises, but how to observe and adapt."* As

David (C) concluded, “*prevention depends on the coach’s personality. That’s not sustainable.*”

DISCUSSION

This qualitative study examined how injury prevention is perceived and practiced across Luxembourg’s sport ecosystem. Grounded theory principles were used to guide the analysis. However, the present study does not aim to generate a formal grounded theory in the strict sense, but rather to develop an empirically grounded conceptual framework that helps explain how injury prevention is shaped by stakeholder interactions and implementation conditions. In this respect, the findings complement existing implementation approaches by providing a context-sensitive perspective on how prevention is translated into practice.^{16 18 20}

Through the voices of athletes, coaches, healthcare professionals, and institutional representatives, three key conditions emerged as critical for fostering injury prevention: clear and coordinated communication, early education and sustained coach support. These conditions are distinct but interact across different levels of the sport system.

Although prevention was often perceived as reactive or disconnected from performance, participants expressed a shared concern for athlete health and recognised the need for more integrated, proactive approaches.

Reframing prevention: from negative connotation to performance enhancement

Although the importance of injury prevention was widely acknowledged, several participants expressed discomfort with how it is typically framed in the field. The term ‘prevention’ itself was often perceived as negative, evoking images of fear, accidents and constraints. This perception contributed to its marginalisation in daily training routines, especially when prevention was understood as something external, medicalised or imposed. As highlighted in previous studies, the way injury prevention is framed significantly influences athletes’ and coaches’ engagement.^{19 32} Reframing prevention not as a reactive or risk-focused obligation but as an empowering strategy to enhance performance and longevity could support better adherence. Participants emphasised that injury prevention programmes must clearly demonstrate their contribution to performance-related outcomes. For many athletes, reduced injury risk represents a distant benefit, whereas improvements in performance, recovery and training availability are immediately meaningful. Unless prevention routines are explicitly linked to performance goals and their effects made visible, sustained engagement is unlikely. Communicating and evaluating injury prevention not only in terms of injury reduction but also in terms of performance-related outcomes aligns with value-based implementation approaches, which emphasise perceived usefulness and relevance for end users.¹⁵

Fragmented efforts despite proximity: specific features of the Luxembourg context

Luxembourg offers a unique context for injury prevention implementation. On one hand, its small size and centralised sports infrastructure could facilitate integration, communication and collaboration. However, participants described a fragmented ecosystem where institutions, clubs and educational structures often operate in silos. Multiple stakeholders, including school programmes, federations, clubs and high-performance centres, were said to act independently, leading to duplication of efforts and inconsistent messaging. This lack of coordination echoes challenges identified in other settings where fragmented governance and communication undermine prevention efforts.^{19 20} Additionally, Luxembourg’s multilingual and multicultural environment may amplify these challenges, especially when key actors differ in language, training background or institutional logic. As some participants noted, the same athlete could receive contradictory advice from different structures, with no system in place to monitor coherence or outcomes. These findings suggest that Luxembourg would benefit from shared platforms, aligned educational and improved communication between stakeholders.

Building the foundations: communication, early education and coach support

Three interrelated pillars emerged from the data as essential to fostering sustainable injury prevention practices: communication, early education and coach support. First, clear and coordinated communication among stakeholders is critical. Several participants highlighted the lack of feedback systems and collaborative frameworks between coaches, medical professionals and institutions. Without structured communication, trust erodes and injury prevention becomes inconsistent. This supports existing evidence that context-specific and system-level coordination is necessary to translate injury prevention from theory into practice.^{17 33}

Beyond communication issues, the limited athlete voice described by participants also points to broader power dynamics within sport settings. In particular, fear of losing one’s place, selection pressure and hierarchical relationships may discourage athletes, especially younger or high-level athletes, from speaking openly about fatigue, pain or recovery needs. These findings align with athlete-centred and safeguarding-informed perspectives, which emphasise the importance of psychological safety, shared decision-making and progressive athlete autonomy in health-related matters.^{32 33}

Second, early education and engagement were emphasised as foundational to long-term adoption. Participants advocated for introducing prevention as a natural component of youth training, making it playful, specific to sport contexts and age-appropriate. This is consistent with the Norwegian sport development model and related research, which demonstrates that early acquisition of motor control, functional movement and risk

awareness is associated with a reduced risk of injury later in an athlete's career.³⁴ In addition, giving young athletes a voice and fostering safe communication around fatigue or pain were also seen as important for building trust and autonomy in health-related decisions.

Third, the role of the coach was consistently identified as central to implementation. Coaches act as the link between medical recommendations and daily training routines, and their beliefs strongly influence whether prevention strategies are applied. However, engagement varied greatly depending on personal experience and perception.³⁵ While no formal certification in prevention exists for coaches in Luxembourg, several participants supported the idea of structured, context-specific education. Initiatives like the European SONAR project offer promising models, equipping coaches with tools to recognise, adapt and implement evidence-based prevention practices. Similar Scandinavian programmes have shown positive results in improving adherence and coach self-efficacy.^{34 36} Investing in coach education and aligning it with national sport priorities could help shift injury prevention from a discretionary task to an integrated part of coaching culture.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, consistent with grounded theory methodology, sampling was guided by conceptual saturation rather than by a predefined sample size.²⁵ While data saturation was assessed through an iterative constant comparative process across interviews and stakeholder profiles, the determination of saturation inevitably involves a degree of researcher judgement. Although multiple researchers contributed to the analytical process to enhance reflexivity and credibility, the identification of saturation remains partly subjective and may be influenced by the researchers' perspectives and analytical frameworks.

Second, although the study included a range of stakeholder roles within the Luxembourg sport ecosystem, certain perspectives were not represented, such as those of younger athletes or high-level policymakers. As a result, insights into early sport experiences, athlete voice and the development of autonomy in health-related decision-making remain indirect. Inclusion of these groups may have provided additional insights into system-level decision-making and early sport experiences. In addition, the sample included proportionally more healthcare and institutional perspectives than coaches or athletes. This may have shaped the salience of themes related to coordination, communication and implementation support, and should be considered when interpreting the findings.

Finally, the findings are embedded within the specific structural, cultural and organisational context of Luxembourg. While this context provides a rich case for exploring injury prevention implementation in a small and centralised sport system, transferability to other

settings should be considered in light of contextual similarities. The transferability of these findings is likely strongest for small, high-income sport systems where multiple actors operate in close proximity, but where coordination across sport, health and educational structures remains only partially integrated.

Implications for future injury prevention strategies and international relevance

Although grounded in the Luxembourg sport ecosystem, these findings have broader relevance for injury prevention in sport, particularly in high-income countries characterised by complex but well-resourced sport systems. Luxembourg's small size and close-knit structures illustrate that proximity alone does not guarantee coordination, and that intentional system design is required to translate evidence-based prevention into coherent practice. Future efforts should therefore move beyond isolated initiatives towards integrated, system-level approaches that strengthen communication, governance and shared responsibility across stakeholders, while placing the athlete at the centre of prevention strategies. In practice, this may involve shared monitoring and communication systems across stakeholders, as well as more aligned coach education pathways integrating injury prevention into routine training.

Supporting implementation through ongoing guidance, and explicitly addressing practical, cultural and organisational barriers, appears essential to facilitate adoption and long-term use of prevention programmes. Demonstrating the impact of injury prevention on performance-related outcomes, alongside injury reduction, may further support sustained engagement by athletes and coaches. Embedding prevention early in youth sport through age-appropriate and engaging practices, and strengthening coach education and long-term support, can foster progressive athlete autonomy and emerge as key levers for building sustainable and transferable injury prevention systems across diverse sport contexts.

CONCLUSION

This study explored how injury prevention is perceived and practiced across the Luxembourg sport ecosystem. While prevention is widely acknowledged as important, it remains inconsistently implemented and often perceived as an external constraint rather than a performance-enhancing strategy. The findings highlight the need to reframe prevention as a tool for sustaining athlete health and optimising performance.

Three key pillars emerged from the interviews: the importance of coordinated communication among stakeholders, the early integration of prevention in youth sport and the pivotal role of coach education and support. In the Luxembourg context, where structures are in place but remain insufficiently connected, a systemic approach is needed to build consistency across organisations.

For prevention to move from isolated initiatives to sustainable practice, it must be embedded into existing systems, supported by shared goals and communicated in a way that resonates with both performance and long-term health. These findings not only inform future efforts in Luxembourg but may also guide other contexts seeking to translate evidence-based injury prevention into community sport settings. Beyond Luxembourg, these findings may be particularly relevant for national sport federations, coach educators, healthcare professionals working in sport and policymakers seeking to strengthen the implementation of injury prevention in similar sport systems.

Acknowledgements The authors would like to thank all partners involved in the Healthy Active project: the Centre Hospitalier de Luxembourg, the Luxembourg Society of Sports Physiotherapy, the Luxembourg Society of Sports Medicine, the Luxembourg Institute for High Performance in Sports, the Luxembourg Olympic and Sports Committee, Sportlycée Luxembourg, INAPS, FLASS, ReFORM and Amsterdam UMC.

Contributors AA conceptualised and designed the study, developed the research protocol, conducted the interviews, led the data analysis and drafted the manuscript. CT and JB-P contributed to the development of the research protocol and independently reviewed the coding process to enhance analytical rigour. CM, NG, JP and CN contributed to the design of the study and provided critical feedback throughout the research process. EV contributed to the methodological framework and provided expert input on injury prevention and implementation. RS supervised the project and contributed to study design and interpretation of findings. All authors critically revised the manuscript for important intellectual content and approved the final version. AA is the guarantor. Artificial intelligence (AI)-based software (Descript.com) was used to assist with the initial transcription of audio-recorded interviews. All transcripts were subsequently manually reviewed and verified for accuracy by the research team. Generative AI tools were also used to support language editing and improve textual clarity. All analyses, interpretations and scientific content are the sole work of the authors.

Funding This research received grant from CMC (Caisse Médico-Complémentaire Mutualiste)—Luxembourg.

Competing interests JB-P is an Associate Editor of *BMJ Open Sport & Exercise Medicine* and was not involved in the peer review or decision-making process for this manuscript.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval The study received ethical approval from the Luxembourg National Research Ethics Committee (202407/01) and followed the Standards for Reporting Qualitative Research (SRQR) and the Consolidated Criteria for Reporting Qualitative Research (COREQ).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

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