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Executive summary

Background

Sport-related injuries are the leading cause of concussion among children and young people and there is growing awareness of the possible long-term impacts of concussion on brain health, including dementia. Although the evidence of a causal link between selected sporting activities and dementia remains uncertain, what is known provides grounds for taking a precautionary approach when providing guidance on concussion management in sport.

It is against this background that, in April 2023, the UK Government and the Sport and Recreation Alliance published the 'UK Concussion Guidelines for Non-Elite (Grassroots) Sports'. Using the strapline 'If in doubt, sit them out', the UK Guidelines aim to improve concussion awareness and management among players, coaches, parents, and sports bodies across England, Scotland, Wales and Northern Ireland.

There is now the opportunity to systematically assess how different sports have implemented the guidelines and understand how widely they are known. This study was commissioned by the Department of Health and Social Care (DHSC) in collaboration with the Department for Culture, Media and Sport (DCMS) to help fill this important knowledge gap.

Aims and approach to the evaluation

The study aimed to examine (i) how the UK Guidelines have been or are being implemented, and (ii) attitudes to and awareness of the UK Guidelines within grassroots sports. We focused on six sports: football, rugby union, gymnastics, field hockey, swimming and taekwondo.

We conducted document reviews to help place the implementation of the UK Guidelines in the context of broader policy considerations, and a desk review of websites and publicly available documents of national governing bodies (NGBs) of six sports. We also carried out 25 interviews with 34 national-level stakeholders to explore how the guidelines have been adopted and disseminated to the grassroots of the selected sports and the support provided to implement the guidelines. Finally, we conducted an online survey of members of British Gymnastics. We selected British Gymnastics because it did not have a specific concussion policy in place prior to the publication of the UK Guidelines. Among the NGBs that adopted the UK Guidelines, British Gymnastics was the only one to have adopted them directly, without tailoring the guidelines to their specific context. In total 289 survey respondents were included in the analysis.

Data collection was conducted between June 2024 and January 2025, capturing experiences 15-18 months after the publication of the UK Guidelines.

Principal findings

All six sports examined provided guidance or policies on concussion on their website. At the time of writing, five of the six sports (British Gymnastics, British Taekwondo, England Hockey, England Football and England Rugby) had either published or provided a link to the UK Guidelines on their website; only British Gymnastics had adopted them in full as its official concussion policy. Swim England had a concussion policy in place but did not reference the UK Guidelines. Notably, none of the sports provided clear signposting to concussion on their homepages, and locating relevant materials typically required navigating through multiple steps on their websites.

Perceptions of key stakeholders involved in the development and dissemination of the UK Guidelines

Key stakeholders interviewed for this study welcomed the UK Guidelines. There was broad support that the UK Guidelines were based on the best available evidence and that they filled an important gap in promoting consistent messaging and supporting NGBs to enact their 'duty of care' to their players and coaches. The pan-sport nature of the guidelines was seen as particularly important given that many people engage in multiple sports. Notably, these are the first concussion guidelines to be adopted across all four UK home nations, and their adoption by other countries, including Australia and New Zealand, further underscores their perceived value.

However, challenges were identified in how the guidelines were communicated, accessed, and understood. There were differing views on how easy the UK Guidelines are to understand. While some thought they were clear and easy to interpret, there were also concerns about their length and technical language. The section on return to activity (education/work) and sport was seen by many to be particularly difficult to follow for a non-expert audience. Some participants felt it was unclear when individuals should consult a healthcare professional, particularly during the 28-day period following a concussion. There was also the perception that the guidelines could be hard to access as they were not easy to find on sports and health websites as also noted in our review of the six sports' websites.

Interview participants differed in their views on who the UK Guidelines were for and how they were intended to be used. For example, there was some uncertainty around whether the guidelines were only aimed at school aged children or also intended for adults. Some described the guidelines as a self-management tool for individuals, while others saw them as a tool for coaches and those with responsibilities for the welfare of players. The definition of 'grassroots' sport was not seen as clear-cut and several NGBs questioned whether the guidelines also applied to higher levels of organised sports that did not have access to medical support. Others suggested that the UK Guidelines should have a wider public health role beyond organised sports, including the need to target individuals taking part in unorganised sport or physical activity and greater engagement of schools.

These issues may in part be explained by a perceived absence of an explicit communication and dissemination strategy. It was noted that communication efforts had focused on the launch of the UK Guidelines and a longer-term strategy was lacking. Some participants linked this to a lack of any meaningful funds being made available for guideline communication. At the NGB level, many interview participants commented that there was a lack of clarity around when the guidelines would be published, what materials would be shared and what they would be expected to do with the guidelines. As a result, not all six sports we looked at had adopted the UK Guidelines. Those that had took different approaches: one used the UK Guidelines exactly as written, others adapted them to fit their own needs, while some felt that their existing guidance sufficiently aligned and they did not need to make any changes.

There was a perception held by some interview participants that the health sector had not fully embraced the guidelines in terms of dissemination and implementation. It was reported that the return to activity (education/work) component of the UK Guidelines have been incorporated into the NHS Pathways (the triage system used by NHS 111 and 999) algorithm and included by the National Institute for Health and Care Excellence (NICE) in the discharge recommendations of their head injury guidelines. Interview participants from the health sector highlighted that concussion was not seen as a high priority for the NHS as sport-related concussion accounted for a very small proportion of

the work of primary and emergency care. Therefore it was taking longer than expected for the guidelines to get embedded in practice.

Finally, interview participants thought that understanding of the signs and symptoms of consciousness was likely to be high among the grassroots given the increasing visibility of the issue at the professional level. But they hypothesised that awareness of the UK Guidelines was likely to be low.

Awareness and knowledge of the UK Guidelines: A survey of members of British Gymnastics

All groups surveyed demonstrated high levels of knowledge of concussion: 92.6% of respondents said that they understood what a concussion is and 94.8% of those correctly identified concussion as an injury to the brain. Coaches and welfare officers identified more correct symptoms of suspected concussion than parents/carers or gymnasts. Coaches and welfare officers also showed a better understanding of the appropriate actions to take following a suspected concussion. Almost all (95.5%) correctly stated that gymnasts should stop training immediately following a suspected concussion compared to just under two-thirds (63.5%) of parents/carers and gymnasts aged 16 years and over. None of the gymnasts aged 11-15 years showed an understanding of the appropriate actions to take; the vast majority (91.5%) believed that the decision to stop training should be made by coaches and welfare officers.

All groups had limited knowledge of the appropriate timelines for returning to school, work, training, and competition following a concussion. Fewer than one in five (16.7%) of the combined group of coaches and welfare officers as well as parents/carers and gymnasts aged 16 years and over correctly stated that gymnasts should not return to school or work immediately after becoming symptom-free. Most respondents had a limited understanding of the recommended timeframe for returning to activities with a risk of head injury after becoming symptom-free.

Just over 40% of survey respondents stated that they recognised the strapline 'If in doubt, sit them out' and over three quarters (75.8%) of those understood the strapline correctly. Coaches and welfare officers were most likely to give a correct response (90.9%), while gymnasts aged 11-15 were least likely to do so (64.9%).

Over two-thirds (69.2%) of respondents did not recognise any of the seven concussion guidelines presented in the survey. Among the 89 respondents who recognised at least one, coaches and welfare officers were the most likely to do so. The UK Guidelines were the most recognised. Of respondents who recognised at least one of the concussion guidelines presented, just over half (57.3%) reported having read them. Those who had read any guidelines were more likely to report they felt confident in recognising and managing a concussion compared to those who had only recognised a concussion-related guideline.

Conclusions

Our study found strong support for the UK Guidelines by the sports sector at the national level, especially for their role in promoting consistent messaging across sports and the four countries of the UK. However, more needs to be done to ensure that the guidelines' key messages are reaching those engaged in grassroots sports. Based on our analysis, we propose a set of options to be considered to ensure that the UK Guidelines are widely implemented and benefit all participants in sports.

Improve accessibility and readability through simplified, audience-specific, and clearly communicated language

The UK Guidelines need to be simplified and tailored to different audiences. Given the high number of younger gymnasts who did not understand the strapline 'If in doubt, sit them out' there is the need to develop a child-

friendly version. Enhancing readability could involve shorter formats like a pocket guide, one-page poster or leaflet, and using other media such as videos at sporting events or on popular TV programmes. Any updates should involve input from the intended audiences to test accessibility and readability, build engagement with and enhance ownership. A small(er) drafting group could lead the process, supported by consultation through focus groups and wider stakeholder input.

Clear and consistent messaging is especially important for the complex return to activity (education/work) and sport section. It was also unclear when to consult a health professional, particularly in the 28-day period following a concussion among stakeholders and survey respondents. Digital tools, such as an app with clear advice and pathways could help users follow the guidelines more easily.

Strengthen national leadership with a clear mandate and resources

A single body at the national level could be appointed to oversee the regular update of the guidelines and lead the development and oversight of a longer-term communication strategy. To be effective, this body would need an explicit mandate and appropriate funding.

Any communication strategy should include regular national and local publicity campaigns to raise public awareness. Key components of the UK Guidelines, especially the return to activity (education/work) and sport section, could be included in regular concussion safety training in sports like first aid courses.

The national body could also host a repository of 'best practice' with learning materials, videos, reporting mechanisms, and free materials for NGBs and others to use and contribute to. This would be especially useful for smaller NGBs with limited capacity to develop their own policies and tools.

There may be opportunities to learn from Australia, where the Australian Institute of Sport (a division of the Australian Sports Commission) has developed and hosts a wide range of resources on concussion in sport for different audiences.

Clarify different stakeholders' roles and responsibilities

Effective implementation of the UK Guidelines requires clearly defined roles and responsibilities across all levels of the sports system. While current guidelines provide actions for coaches, teachers and volunteers, parents or carers, and players, the roles of other key stakeholders, particularly within the health sector, remain unclear. For example, ambiguity around who should authorise return to sports can lead to inconsistent and potentially unsafe decisions. Future updates of the UK Guidelines should include a clear framework outlining responsibilities for each aspect of concussion management, what these responsibilities entail, and how they should be actioned. A coordinated and clearly articulated approach will support safe and consistent concussion practices across all settings.

Expand dissemination to reach and engage all groups involved in sports

The further development of the UK Guidelines should actively engage the education sector and schools in a strategic way. Further, the current dissemination and implementation strategy through the organised sports sector risks overlooking the large number of people who take part in informal or recreational sports and physical activities not linked to an NGB.

Greater use could be made of the regular Active Lives Surveys overseen by Sport England by adding concussion-related questions and so enable monitoring knowledge about recognising and managing concussion in the wider population.

Embed guideline dissemination in wider policies addressing behaviour in sport

Clear and widely delivered concussion guidelines alone will not necessarily translate into improved concussion management, such as increased reporting of concussion or adherence to return to education/work and sport guidance. This is often due to a lack of a supportive environment in sport. While education remains essential, greater attention must be given to the underlying culture within sport. Normalising reporting and reducing pressures that discourage it will be key to protect players. A system-wide approach is needed that takes account of the unique needs of each stakeholder and reconciles performance and team commitment with safe concussion practices.

Suggestions for further research

Further research should support a comprehensive approach to concussion management by strengthening the evidence base for prevention. Such an approach would not only consider mitigating the acute health impacts of sport-related concussion but also strive to reduce the incidence of concussion in sport. Misconceptions about preventive measures remain prevalent and need to be addressed. Research is also needed to understand why concussion awareness remains a lower priority in some high-risk sports, with a focus on structural and financial barriers within less well-resourced NGBs. There is a particular need for further research examining concussion-related behaviours in sports, drawing on multidisciplinary insights and using qualitative approaches to explore the cultural and wider contextual factors that shape how concussion is recognised, reported and managed in different settings and so address the gap between knowledge and practice.

1 Background

There is growing evidence for the potential long-term impacts on brain health, such as cognitive impairment or neurodegenerative disease, among former participants in youth and adult sports, and the rare, but devastating, second impact syndrome.[1 2] This has led to increasing attention to sport-related concussion as an important public health concern.

Sport-related injuries are the most common causes of concussion among children and young people.[3 4] Existing studies point to an increased risk of neurological disorders, including dementia, among former professional athletes who had been exposed to repetitive head impacts,[5 6] and, possibly, among amateur athletes.[7] The overall evidence remains difficult to interpret however, due to methodological limitations, such as the ecological nature of many studies and/or lack of adequate control for confounding factors.[8] At the same time, despite the relatively high incidence of concussion for contact and collision sports, participation in (team) sport has been associated with social, psychological and physical benefits.[9-11]

In the UK, the cross-party Digital, Culture, Media and Sport Committee's (referred to as 'Select Committee' hereafter) Report on Concussion in Sport (2021)[12] highlighted that while the evidence of a causal link between particular sporting activities and later development of dementia remains uncertain, what is known should provide grounds for national governing bodies (NGBs) of major sports and Government to take a precautionary approach to concussion in sport. The Select Committee recognised that there were multiple sources of information and advice on managing sport-related concussion, including guidance developed by different sports. Citing the experience in Scotland, where the Scottish Government and Sport Scotland, together with a team of experts, had developed a single concussion policy covering all sports in Scotland in 2015,[13] the Select Committee emphasised the need for a more coherent approach in the form of a UK-wide protocol for concussion across all sports that should be used as a minimum standard by NGBs.

In response to the Select Committee's recommendations, the Government outlined, in December 2021, a series of actions to be taken to reduce the risks associated with concussion and head injuries in sport.[14] The Government's response details actions in the areas of research, education, health and technology (Appendix 1). One key education action included the commissioning of a set of shared protocols around concussion in sport by the Department for Culture, Media and Sport (DCMS), which resulted in the publication of the 'UK Concussion Guidelines for Non-Elite (Grassroots) Sports' in April 2023 (referred to as 'UK Guidelines' hereafter).[15]

The UK Guidelines build on the Scottish guidance and use the same strapline 'If in doubt, sit them out'. They aim to improve concussion awareness and management among players, coaches, parents, and sports bodies, particularly in settings where trained health professionals are less likely to be routinely present; the guidelines are targeted at people of all ages (Box 1). A Concussion Communication Group coordinated by the Sport and Recreation Alliance was set up to help communicate and disseminate the guidelines to ensure that "participants at all levels of sport are aware of the key messages around concussion".[14 (p. 27)]

Box 1. Key elements of the UK Concussion Guidelines

- **Recognise signs and symptoms of suspected concussion:** Such as headache, dizziness, nausea, memory disturbance (e.g. confusion) and balance problems. Be aware of 'red flags' symptoms where urgent medical assessment is required.
- **Immediate removal from play:** If a concussion is suspected, the player should be removed from the game immediately.
- **24-48 hour relative rest period:** Minimise screen time – 'gentle exercise only', followed by a gradual stepwise return to normal life.
- **Medical assessment:** Get assessed by an appropriate healthcare professional onsite or access the NHS by calling 111 within 24 hours of the incident. Seek GP advice if symptoms continue over 28 days.
- **Gradual return to activity:** Follow a staged programme to gradually return to study, work, sport training and competition once symptoms subside.
- **Prioritise education/work:** Returning to normal daily activities like school or work should take priority over returning to sport.

The UK Government further actioned the formation of a Concussion in Sport Research Forum in conjunction with the Medical Research Council in 2022.[16] The Forum was tasked with identifying priority research questions for the sector, and among these, the Forum highlighted the need for an assessment of the impact of the UK Guidelines at different levels of individual sports. Such assessment was considered important to understand how to improve the efficacy of the guidance in sport and other settings; it may also provide important pointers for the development of other possible future health/sport-related interventions or guidance. Such knowledge is also expected to allow the government to refine and monitor the implementation of the guidance. With the publication of the UK Guidelines in April 2023, allowing for the guidelines to embed more widely, there is now the opportunity to systematically evaluate how the guidelines have been implemented and understand how widely they are known. This study was commissioned by the Department of Health and Social Care (DHSC) in collaboration with DCMS to help fill this important knowledge gap.

1.1 Aims and objectives of the evaluation

The overarching aims of this study were to examine (i) how the UK Guidelines have been or are being implemented, and (ii) attitudes to and awareness of the UK Guidelines within grassroots sport. We focused on six sports: football, rugby union, gymnastics, field hockey, swimming and taekwondo.

Specifically, we sought to:

- review the concussion policies published by six sporting NGBs and assess the visibility and accessibility of these policies;
- explore how NGBs and other national stakeholders involved in the development and/or dissemination of the guidelines have implemented the UK Guidelines and any strategies they have taken to support the grassroots level to do so; and
- examine attitudes to, awareness and use of the UK Guidelines among coaches, welfare officers, participants and parents within British Gymnastics.

2 Methods

The evaluation used a combination of document reviews, key informant interviews and a survey. Data was collected between July 2024 and January 2025, capturing experiences 15-22 months after the publication of the UK Guidelines. In the following, we briefly summarise the methodological approach. Further details on approaches to data collection and analysis are presented in Appendix 2. The focus for this work was England, reflecting the devolved nature of sport and health in the UK.

2.1 Selection of sports

The six sports examined in this research were identified in collaboration with DCMS and DHSC. Selection was based on two principal considerations: (a) the sport is associated with a comparatively high frequency of sport-related concussion; and (b) the sport captures a wide demographic in terms of gender, age and ethnicity. In relation to the first consideration, we used the term 'frequency' rather than incidence or risk, which allowed us to include sports that have a lower risk such as swimming but large numbers of people engaging in that sport. Furthermore, we sought to capture a continuum of risk, which we felt to be important from a wider population health perspective. Finally, a focus on six sports was also deemed to be feasible within the timeframe available for this study.

Although it is difficult to compare epidemiological studies across sports because of differences in populations studied and measures used, review evidence suggests that among youth and young people, contact or collision sports such as rugby, football and hockey are associated with a higher risk of concussion.[4 17-20] A higher risk of concussion was also reported for martial arts such as Taekwondo.[21] Further, a recent retrospective study among collegiate swimmers in the USA suggests that the risk of sustaining a concussion in this sport may be higher than previously thought.[22] Female athletes tend to have a higher rate of concussion in some sports, in particular football and hockey.[20 23-25]

In terms of engagement, in 2023-24, team sports, gymnastics and swimming were among the most frequent activities that children and young people in school in England engaged with at 57%, 29%, and 26%, respectively.[26] Data from the Active Lives Adult and Children Surveys in England point to considerable variation in levels of engagement in different sports among people with different ethnic backgrounds.[27] At the risk of oversimplifying what is inherently complex, data suggest that relative to their population share, white British people across all ages tend to be overrepresented in sports such as swimming, rugby and hockey while being underrepresented in martial arts. Conversely, people from Asian communities tend to be overrepresented in football and martial arts but underrepresented in rugby and swimming. Black adults tend to be overrepresented in football and gymnastics, while underrepresented in swimming. Although black children and young people are also overrepresented in football, they are underrepresented in gymnastics, swimming and rugby. People from mixed ethnic backgrounds are more likely to be engaged in swimming, football, gymnastics and martial arts.

The six sports selected for this study therefore capture a range of risk in terms of sport-related concussion as well as different demographics. The selected sports were also of particular interest to DCMS.

2.2 Framing the evaluation

To guide the evaluation, we developed a logic model,[28] which sets out the intended objectives and pathways to impact of the UK Guidelines. The logic model was informed, largely, by the Government Response to the 2021 Select Committee Report on Concussion in Sport mentioned above.[14] We also drew on the draft Terms of Reference for an expert group established by the Government to develop and communicate the UK Guidelines.[29] The development of the logic model involved: identification of inputs (resources and people involved); outputs (actions and activities undertaken to help achieve outcomes); and intended outcomes (results of the activities).

2.3 Document review

2.3.1 Evolution of the UK Guidelines

To help place the implementation of the UK Guidelines in the context of broader policy considerations concerning acquired brain injuries in sport, we reviewed UK parliamentary debates for the period 1962 (earliest postwar date) to 2024. We sourced transcripts of debates and discussions taking place in the House of Commons and the House of Lords using the Hansard search form (https://hansard.parliament.uk). The review enabled the development of a timeline of events, which we introduce below.

2.3.2 Concussion policies or guidelines published by six sports in England

We conducted a desk review of websites and publicly available documents of NGBs of the six sports in England.[(a)] Documents were identified using the Google general search engine and broad search terms combining 'concussion' and '[organisation name]'. Following established methods for reviewing websites,[30] we examined whether the NGBs had published any policy or guidance on concussion, their ease of access, and the degree to which the guidance aligned with the UK Guidelines. It is important to note that this review focused solely on the visibility and accessibility of concussion information on NGBs' official websites. Other potential dissemination channels such as social media, newsletters, or in-person communications were outside the scope of this review. The review was conducted in October-November 2024.

2.4 Key informant interviews

Key informant interviews sought to explore how the guidelines have been adopted and disseminated to the grassroots level of the selected sports and the support provided to implement the guidelines. We conceptualised 'key informants' as individuals able to provide high level perspectives on the development and implementation of the UK Guidelines. This included people who were directly involved in the process, contributing knowledge that would help understand how the UK Guidelines were disseminated and implemented.

2.4.1 Interview participants and sampling strategy

Interview participants were selected to include representatives of each of the NGBs of the six sports identified for the evaluation (football, rugby union, gymnastics, field hockey, swimming and taekwondo); national sports councils responsible for growing grassroots sport in each of the four UK nations, and national organisations involved in the development and/or dissemination of the UK Guidelines. We used a combination of purposive and snowball sampling. Potential participants were identified from a list of the national organisations that were members of the Concussion Communication Group.[31] Additional study participants were identified through snowballing from people interviewed for this study.

(a) Four of the NGBs examined cover England (England Football, England Hockey, England Rugby, Swim England) while British Gymnastics and British Taekwondo cover all of the UK.

Potential study participants were contacted by email, as appropriate, to take part in an interview. In this initial approach, potential participants were provided with the information sheet about the study, shared via email. Upon agreement to take part, a date for the interview was set, the mode of interview (secure video conferencing platform Zoom or MS Teams) and dates that were most convenient for the participants. Participants were also provided with the consent form prior to the interview. Once they had given their consent to participate by returning the signed consent form, the agreed date of the interview was confirmed. Consent for participating, and having the interview recorded, was also confirmed verbally at the beginning of the interview.

2.4.2 Interview data collection

Interviews used a semi-structured topic guide which the research team developed based on the key evaluation questions. Interviews sought to explore: the nature and scope of organisations' concussion policies, and the degree to which these draw on the UK Guidelines and/or the role that the UK Guidelines have had in organisations' concussion policies; how the guidelines have been communicated and disseminated to the grassroots; the actions that had been or are being taken to support guideline implementation at the grassroots; perceptions of enablers of and challenges to guideline implementation at the grassroots.

We contacted a total of 43 individuals across identified organisations. Four organisations did not respond or declined to be interviewed. These included one national governing body (NGB) and three medical associations or health sector organisations. Our final sample included 34 key stakeholders participating in 25 interviews (Table 1).

Table 1. Participants in key informant interviews

Organisation	Number of interviews	Number of people interviewed
National governing bodies for individual sports	5	6
England government departments and sport bodies	6	7
Devolved nations' sport bodies	3	5
Sports training and education	2	3
Academic departments, research organisations and experts in sports medicine	6	7
National Health Service (NHS) and medical associations	3	6
Total	**25**	**34**

Interview participants represented NGBs for five of the six sports selected for the evaluation. We further interviewed representatives of national sports councils responsible for growing grassroots sports and other relevant national organisations and people involved in the development and/or dissemination of the UK Guidelines.

All interviews were carried out between July and November 2024. They were recorded and transcribed, with participants' permission, and stored on the secure LSHTM network. Transcripts were delinked from any personal information and allocated a unique identifier to ensure confidentiality.

2.4.3 Interview data analysis

Interview transcripts were analysed following Ritchie and Spencer's Framework approach,[32] as described by Gale for application in health policy.[33] This included familiarisation of data through reading and rereading transcripts and organising data according to pre-defined topics, and synthesising and contrasting data according to core themes thus identified. Data from the document review and interviews were triangulated to provide a comprehensive overview of the extent to which the UK Guidelines have been adopted across different organisations at the national level, and how these organisations have been or are supporting guideline implementation at the grassroots level.

2.5 Stakeholder engagement workshop

Upon completion of the document review and key informant interviews, we conducted a stakeholder engagement workshop to reflect on preliminary findings and validate our understanding of some of the key events leading up to the development and publication of the UK Guidelines. Workshop participants included UK members of the UK Guidelines drafting group,[29] the commissioners of the study (DHSC and DCMS) and representatives of the Sport and Recreation Alliance.

The workshop was held in December 2024. It was designed as an informal and interactive event; it provided an opportunity to present preliminary findings from the work conducted by that time and explore areas requiring further clarification. We used open-ended questions to explore issues that we were unable to resolve from interviews and document analysis, thereby ensuring a more comprehensive understanding of the implementation and anticipated impact of the UK Guidelines.

2.6 Survey of members of British Gymnastics

We conducted a survey of members of British Gymnastics to understand attitudes to, awareness and use of the UK Guidelines. We selected gymnastics based on early scoping work for this evaluation, which found that several NGBs had already developed concussion policies that predated the publication of the UK Guidelines at the time of this study. For example, the HEADCASE programme of the England Rugby Football Union (RFU) includes a range of resources, such as 'extended guidelines' and e-learning tools.[34] The RFU HEADCASE programme was first developed in 2013 and has been updated and expanded since then.[35] It is reasonable to assume that awareness and knowledge among RFU stakeholders (players and/or their parents, coaches, welfare officers and others) derive, at least in part, from sources other than the UK Guidelines. A survey of RFU stakeholders would provide insights into awareness of and knowledge about concussion and its management, but for the reasons outlined above it would be difficult to relate any such knowledge to the UK Guidelines specifically.

Conversely, British Gymnastics did not have an explicit concussion policy in place prior to the publication of the UK Guidelines. Further, British Gymnastics appeared to be the only NGB of those included in this study that solely adopted the UK Guidelines and referred to these as such (see also Section 3.4.5).[36] Focusing on British Gymnastics therefore allowed more readily for direct links to be made between awareness, knowledge and potential use of the UK Guidelines. We received the support of British Gymnastics to undertake the survey.

2.6.1 Survey development

The survey of members of British Gymnastics aimed to assess not only general awareness of and attitudes towards concussion but, specifically, awareness of the UK Guidelines. We therefore developed a survey tool tailored

specifically to this purpose. The details of survey development are provided in Appendix 2.2. In brief, we conducted a review of existing concussion-related measurement tools, analysing a total of 34 studies, from which we extracted survey questions to develop the British Gymnastics survey tool. We developed separate questionnaires for four principal groups:

- Parents/carers of child gymnasts aged under 11 years.
- Child gymnasts aged 11 to 15 years: Most secondary school aged children (aged 11 and over) are competent to provide consent,[37] and we invited member gymnasts aged 11-15 years to complete the survey themselves, although they could also choose to ask an adult to complete the survey with them.
- Adult gymnasts aged 16 years and over: While legally young people are only considered 'adult' from age 18 years, we chose 16 years as the cut-off because: (i) gymnasts from this age can hold their own British Gymnastics membership account,[38] and (ii) young people are considered adult in relation to accessing NHS services from that age.[39]
- Coaches and welfare officers.

Separate questionnaires were intended to ensure that the questions were appropriately tailored in terms of language but also to capture the different responsibilities set out in the UK Guidelines for different groups. For example, to ensure readability and accessibility for children aged 11 to 15 years, we adapted the wording of questions from the Child Sport Concussion Assessment Tool 5th Edition (Child-SCAT5).[40] Further, as parents are responsible for managing the health and care of young people under 16 years of age, questions related to care-seeking following a concussion were only included in the questionnaires for parents and adult gymnasts.

The questionnaires consisted of four sections: demographics and sports experience, concussion awareness and knowledge, return-to-sport knowledge, and training experience and guideline recognition (Table 2).

Table 2. British Gymnastics questionnaire sections

Survey section	Questions
Demographics and sports experience	• Age • Gender • Ethnicity • Club membership • Coaching qualifications (coaches only) • Gymnastics practice experience (gymnasts only) Questions were tailored to each survey respondent group
Concussion awareness and knowledge	Respondents' understanding of concussion symptoms and the actions they would take if a concussion were identified. Questions were consistent across all respondent groups and aligned with the UK Guidelines to evaluate familiarity with the guidelines.
Return to sport	Days of return to sports and competitions in line with the UK Guidelines to test respondents' understanding of the UK Guidelines. This section was identical across the four groups.
Training experience and guideline recognition	Respondents' experience of concussion-related training, awareness of available guidance, recognition of the UK Guidelines strapline, and sources of information. Most questions were based on the UK Guidelines, aiming to assess respondents' awareness and access to the guidelines.

The draft questionnaires were reviewed by members of the project advisory group and British Gymnastics to ensure the questions captured the key elements of the UK Guidelines and that they were appropriately tailored to the gymnastics context and target groups.

We conducted cognitive interviews with four active gymnasts aged 11 to 14 years. Cognitive interviewing is used to explore how individuals comprehend and evaluate survey questions, what information they draw on to answer a question and whether questions are easy or difficult to answer, or whether (parts of) a question may be confusing.[41] This exercise helped refine the survey questions to ensure that they were widely understood. For example, the options for levels of gymnastics competition were refined considering feedback from gymnasts to avoid using the term 'recreational', which children found difficult to understand. For questions about participation in other sports, we added further detail such as frequency and locations to enhance clarity.

2.6.2 Survey participants and data collection

Our study targeted all British Gymnastics members irrespective of age. The target population for the survey were 400,096 registered members (incl. 393,041 gymnasts and 9,826 coaches) as at 31 March 2024.[42] The survey was run online by the research team using the Qualtrics surveys tool.[43] The survey was distributed by British Gymnastics on behalf of the research team to all registered members as part of their member newsletter. It included a brief introduction and anonymous link to the survey. British Gymnastics distributed the same newsletter in two waves, one targeted at coaches/welfare officers and one targeted at parents/carers and gymnasts, with tailored introductions used for each group. For the latter group, the introduction specified that for parents/carers of gymnasts under the age of 11 years, the parent/carer should complete the survey on behalf of their child. For gymnasts aged 11 years and over, the gymnast was invited to complete the survey themselves, with the option for their parent/carer to be present when doing so. Gymnasts aged 16 years and over whose parent or carer held their British Gymnastics accounts were also invited to complete the survey themselves.

All survey participants accessing the anonymous link to the survey were informed about the purpose of the survey by means of an invitation letter, an information sheet and an overview of the study at the beginning of the survey. The overview did not specifically mention concussion but more generally referred to sport injuries to reduce the risk of respondents researching concussion before completing the survey. Upon completion of the survey, participants were provided with detailed information about concussion and links to further resources. Survey respondents were able to withdraw at any time by closing their browser and not completing the survey. To incentivise participation, respondents were invited to enter a prize draw upon completion of the survey.[44] The prize involved a £20 shopping voucher. The survey was accessible from 15 November 2024 to 2 February 2025, with two follow-up reminders sent on 16 December 2024 and 20 January 2025.

2.6.3 Survey data analysis and synthesis

Completed survey data were extracted from Qualtrics and cleaned to address low quality responses. Responses identified as potentially invalid were removed. This included entries suspected of being submitted by automated bots, duplicate submissions, and fraudulent responses. Additionally, 'speeders' (respondents who completed the survey in under three minutes) and 'straight liners' (individuals who selected the same response option for all questions) were excluded from the analysis. Furthermore, any incomplete responses were removed from the final dataset.

Data analysis included calculation of frequencies and proportions for: demographic information, levels of concussion awareness, return to school/work/sport knowledge, concussion-related training, and recognition of relevant guidelines.

2.7 Ethical approval

The study was approved by the London School of Hygiene & Tropical Medicine ethics board (Ref. 30999 and 31257). Data collection tools such as interview topic guides, survey questionnaires, information sheets and consent forms are available from the authors upon request.

3 Findings

This chapter presents the findings of the evaluation. We first present the timeline for the wider context within which the UK Guidelines were developed and published. We then report on the key findings from the document review and key informant interviews. We finally present the findings of the survey of members of British Gymnastics.

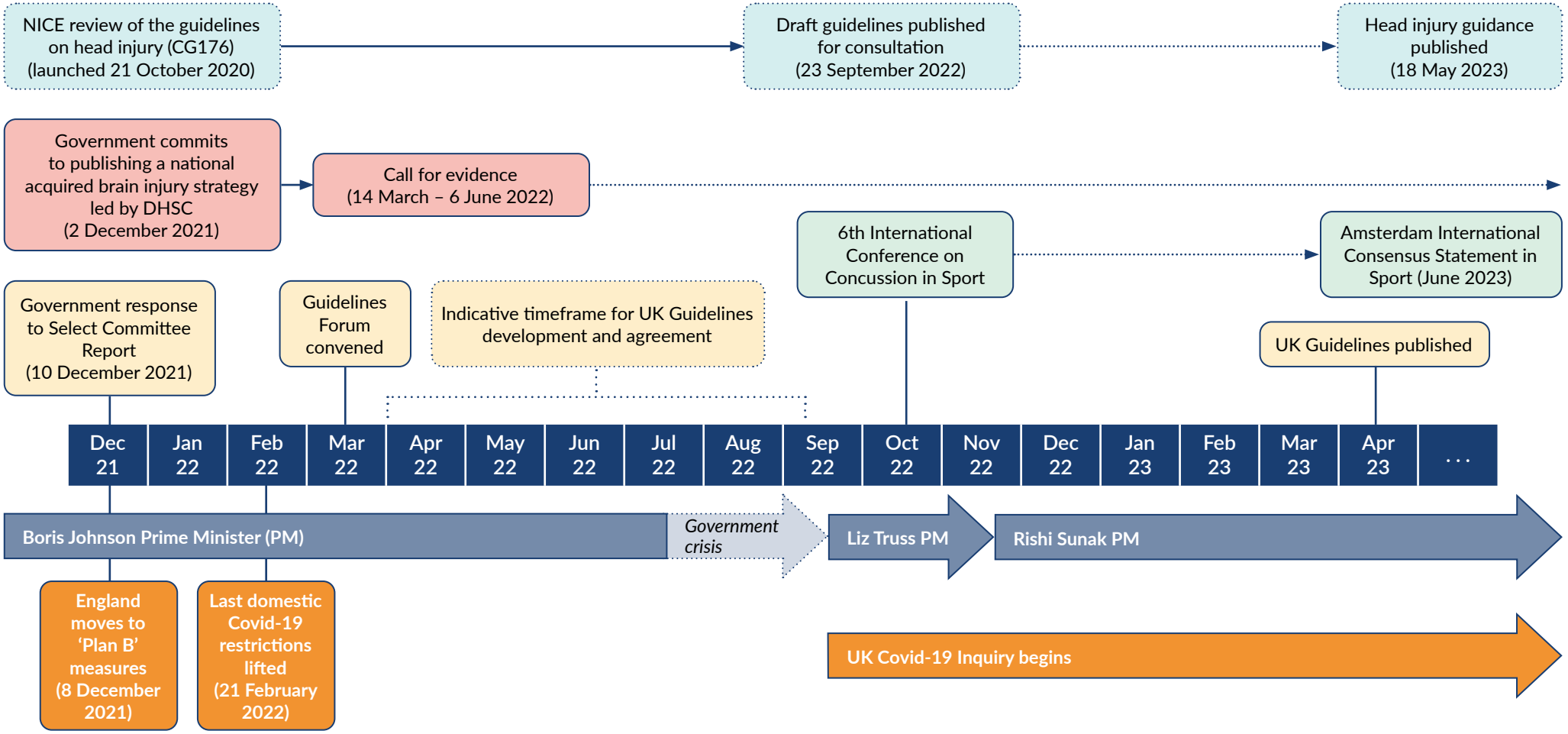
3.1 Evolution of the UK Guidelines

Parliamentary debates around concussion and sports can be traced back to at least the 1960s, with an initial focus on the sport of boxing (see Appendix 3 for an overview of debates related to concussion in sports in the House of Commons and House of Lords since 1962). However, as highlighted in the Introduction to this report, it is only more recently that growing evidence around the potential long-term impacts on brain health among participants in youth and adult sports has led to increasing public concern about sport-related concussion. The development of the UK Guidelines was driven by the 2021 Select Committee's Report on Concussion in Sport, following which the Government committed to commissioning the development of a "set of shared protocols around concussion in sport"[29 (p. 17)] (see Appendix 1 for a summary of the main actions outlined in the Government's response to the Committee's report).

Figure 1 illustrates the timeline of the development of the UK Guidelines, starting in December 2021, when the Government published its response to the 2021 Select Committee's Report on Concussion in Sport to the eventual publication of the UK Guidelines in April 2023. As indicated, a Guidelines Forum (initially known as 'Concussion in Sport Foundation Protocol Forum') was convened in March 2022, with an indicative timeline for the guidelines to be developed and agreed during the summer of 2022. The Guidelines Forum comprised two separate, but linked, groups; the guidelines drafting group and the guidelines communication group (see Section 3.2).

The development of the UK Guidelines took place in the context of broader developments in the health and sports sectors, such as the National Institute for Health and Care Excellence's (NICE) review of the 'Head injury: assessment and early management' clinical guideline starting in October 2020; the initiation of the development of a national strategy on acquired brain injury led by DHSC in 2021, which is ongoing;[45 46] and the development and subsequent publication of the 'Amsterdam 2022 International Consensus Statement on Concussion in Sport'.[47] Guideline development was also set against a background of what has been described as a 'turbulent year' in politics, seeing three prime ministers, four chancellors and mass ministerial resignations, along with ongoing investigations into alleged breaches of Covid-19 regulations by the prime minister's office.[48]

Figure 1. Timeline of the development of the UK Guidelines, December 2021 to April 2023



Key

- Review of the National Institute for Health and Care Excellence (NICE) guidelines on head injuries
- Development of a cross-government national strategy on acquired brain injury being led by the Department of Health and Social Care (DHSC)
- Development of the UK Guidelines
- COVID-19 pandemic

Sources: [12, 14, 45, 46, 49]

3.2 Framing the evaluation: What was intended to happen once the UK Guidelines had been published?

Figure 2 outlines our understanding of the intended objectives and pathways to impact of the publication of the UK Guidelines based on the Government's Response to the Select Committee Report on Concussion in Sport[14] and the Concussion in Sport Foundation Protocol Forum's Terms of Reference.[29]

In its response to the 2021 Select Committee Report on Concussion in Sport,[14] the Government committed to establishing, in conjunction with the Sport and Recreation Alliance (SRA) and Sport England, a Guidelines Forum as noted above. The Forum comprised two groups: the guidelines drafting group, which was to bring together "highly qualified and respected medical experts working in the field of concussion" and who were responsible for developing and agreeing on "a single set of shared concussion guidelines across the whole of the UK".[29] A separate, but linked guidelines communication group, convened by the Sport and Recreation Alliance, comprised communication experts who represented a range of organisations and settings where the guidelines would be implemented, such as sport, education, and health sectors. The purpose of the communication group was to "design and implement plans to communicate the agreed [guidelines] to stakeholders"; these were primarily sport participants and those "involved in delivering sporting activities".[29]

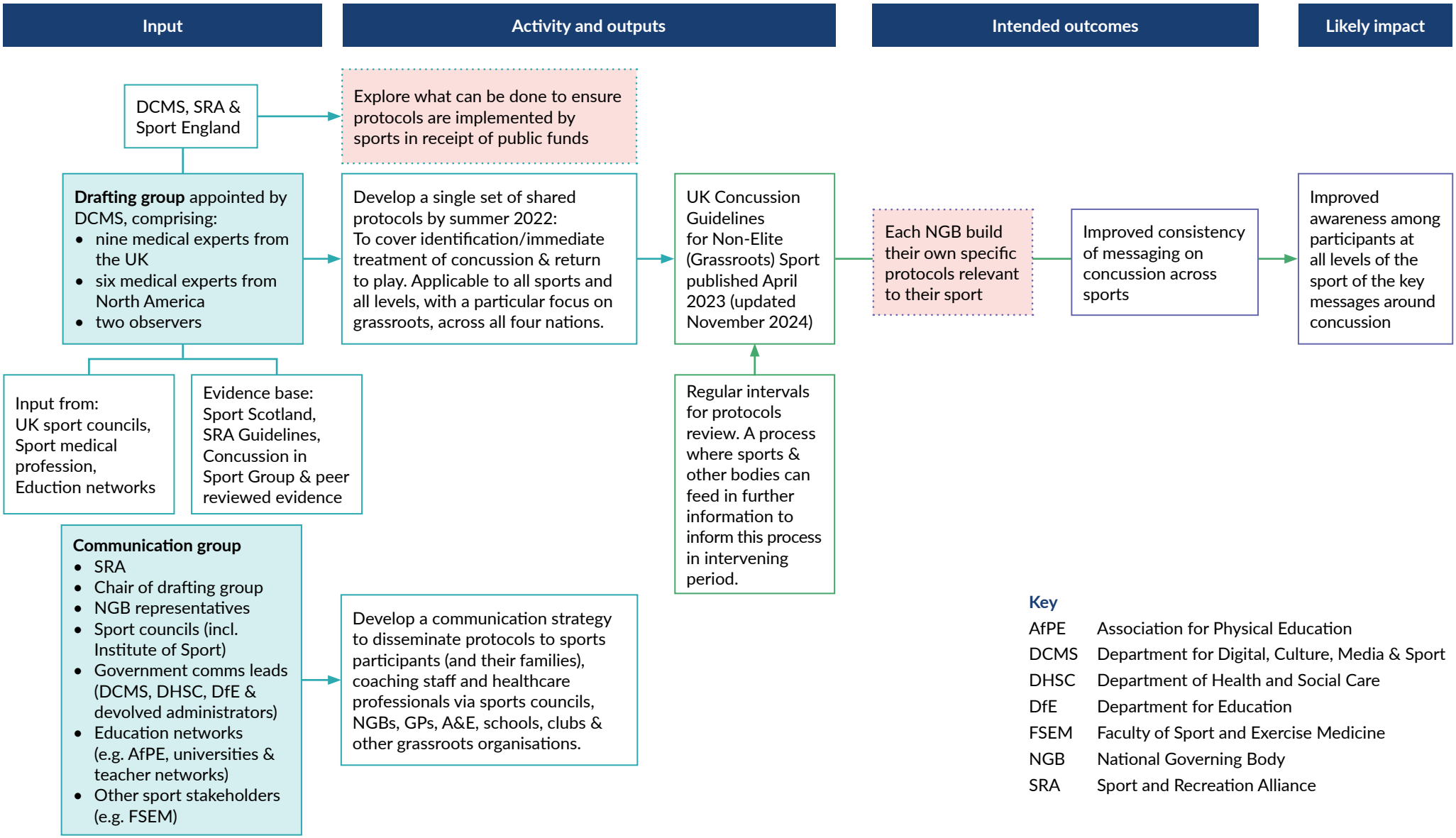
The guidelines were to cover the identification and immediate treatment of concussion in sport, both on and off the field, and return to activity (education/work) and sport criteria. They were intended to be applicable to all sports and all levels of sport, with a particular focus on grassroots sport, for all ages, genders and across all four nations of the UK. Guideline development was to take account of the most recent guidance issued by the Concussion In Sport Group (CISG)[50 51] and relevant high-quality evidence, and build on existing relevant guidance, such as the concussion guidance developed by the Scottish Government and Sport Scotland.

The Terms of Reference for the Guidelines Forum further stipulated that the Forum should recommend regular intervals for reviewing and updating the guidelines and establish a process that would enable sports and other relevant bodies to feed in to inform the review and updating process. Finally, the Forum was expected to "design and oversee the process of communicating" the guidelines to a wide range of target groups, including sports participants, coaching staff and healthcare professionals and that this process should involve sports councils, NGBs, healthcare practitioners, and others.

There was an expectation that the UK Guidelines would form an "initial baseline upon which each governing sport body will build their own specific protocols relevant to their sport",[14 (p. 16-17)] although this was not further elaborated on in the Terms of Reference for the Guidelines Forum.[29] It was anticipated that the UK Guidelines would lead to consistent messaging across sports and increased awareness of the key messages among sports participants and other key target groups.

Of note, reviewed documents, including the 2021 Select Committee Report on Concussion in Sport[12] and the Government's response to that report referred to concussion 'protocols'.[14] It was only later, following the development of the Terms of Reference for the Guidelines Forum that the terminology was changed to 'guidelines'.

Figure 2. Intended objectives and routes to impact



Note. Developed from [14; 29]. **Aqua shaded boxes:** Groups tasked with developing and communicating the UK Guidelines. **Coral shaded boxes:** Only mentioned in [14].

3.3 How have national governing bodies communicated the UK Guidelines: A review of NGBs' websites

Table 3 presents a summary of the availability of concussion policies on the NGB's websites for the six sports examined, how easy they were to find, and the degree to which these policies draw on the UK Guidelines.

At the time of writing, all six sports presented guidance or policies on concussion on their website. It was notable that none of the sports provided clear signposting to concussion on their landing pages (homepage). Finding NGBs' concussion guidance or policies typically required at least two steps via the NGB's 'Governance' and 'Health and Safety' pages or equivalent (British Gymnastics, British Taekwondo, England Hockey, Swim England). The England Football Association's (FA) concussion policies could only be identified by using the search engine while England Rugby included them as part of their player welfare information within the 'Run the Game' section of the website. Five of the six sports (British Gymnastics, British Taekwondo, England Hockey, the England Football and England Rugby) had either published or provided a link to the UK Guidelines on their website. Only British Gymnastics had fully adopted the UK Guidelines as its official concussion policy. The other four sports had also developed their own guidelines. England Football and England Rugby both updated their concussion policies after the UK Guidelines were released, and explicitly stated their policies were based on them, although both include additional elements not covered by the UK Guidelines, such as advice on managing repeat head injuries (see Table 3). British Taekwondo's guidance was also reviewed since the publication of the UK Guidelines, although its return to play advice does not align with the national guidelines. Similarly, England Hockey's guidance[52] return to play guidance differs. However, its guidance predates the UK Guidelines and at the time of writing, its website noted that they "endorse the guidance which now applies to all clubs" and it was reviewing its policy to bring it into alignment.[53]

Swim England's website and concussion guidance did not include a visible reference to the UK Guidelines. However, their guidance, first published in March 2023,[54] uses the same strapline 'If in doubt, sit them out'. [55] Like British Taekwondo and England Hockey, the advice on return to play did not align with the UK Guidelines.

Table 3. Summary overview of concussion guidance or policies published on the websites of the six priority sports included in the evaluation

National Governing Body	UK Guidelines available on NGB website	Ease of finding UK Guidelines on website	Evidence of tailored UK Guidelines on NGB website	Alignment of NGB tailored guidelines with the UK Guidelines
British Gymnastics	Yes	Concussion not mentioned on homepage. Two steps: 1. Select Policies and Procedures from drop down menu under 'Safe and Fair Sport' at top of home page; 2. Select Concussion guidance for link to the UK Guidelines.	No	N/A
Swim England	No	N/A	Swim England Concussion Guidance precedes the UK Guidelines (March 2023); it is available for download from the Swim England Concussion Guidance webpage.	Return to training advice differs by age group: "Over 18 should be a minimum of 24 hours" duration and individuals should only progress if they are completely symptom free. Swimmers aged 18 years and under should spend a minimum of 48 hours at each stage' and those under age 13 should seek guidance from a doctor about how quickly to progress through the stages.

Table 3. Summary overview of concussion guidance or policies published on the websites of the six priority sports included in the evaluation

National Governing Body	UK Guidelines available on NGB website	Ease of finding UK Guidelines on website	Evidence of tailored UK Guidelines on NGB website	Alignment of NGB tailored guidelines with the UK Guidelines
British Taekwondo	Yes	Concussion not mentioned on homepage. Two steps: 1. Select Governance from menu at top of home page; 2. Select Health & Safety from drop down menu: the UK Guidelines are listed at bottom.	British Taekwondo procedure is reported as a news item under 'UK Concussion Guidelines' (September 2023 and July 2024).	The suspension/protection period for returning to play following suspected concussion is longer than the UK Guidelines and differs by age group: • 17 years and over: 30 days • 15-16 years: 40 days • 14 years and under: 50 days • Aligns with World Taekwondo procedures.
England Hockey	Yes	Concussion not mentioned on homepage. Two steps: 1. Select Safe hockey from the drop down menu under Governance at top of home page; 2. Select Planning Safe Hockey: the UK Guidelines linked as one of eight topics.	England Hockey concussion policy precedes the UK Guidelines; Item 'Does England Hockey have a policy on concussion?' refers to guidance first published in November 2016 and updated in December 2018. Planning Safe Hockey webpage notes that "England Hockey concussion policy is under review currently and will be updated to align to the DCMS guidance".	Return to play advice differs by age group: • Under 18 years: 14 days' rest, and minimum return 23 days post injury. • 18 years and over: 24 hours free of all symptoms rest, and minimum return 6 days post injury. Includes advice on a graduated return to school.

Table 3. Summary overview of concussion guidance or policies published on the websites of the six priority sports included in the evaluation

National Governing Body	UK Guidelines available on NGB website	Ease of finding UK Guidelines on website	Evidence of tailored UK Guidelines on NGB website	Alignment of NGB tailored guidelines with the UK Guidelines
Football Association (England)	Yes	Concussion not mentioned on homepage. Two steps: 1. Search for concussion leads to Concussion and brain health in football; 2. Click on Brain Health webpage: the bottom of webpage provides downloadable resources including the UK Guidelines.	Football Association version of 'If In Doubt, Sit Them Out. Concussion Guidelines' (August 2023) downloadable from Brain Health/Concussion in Football webpage.	Recommends for UK Guidelines to be followed where no suitably trained healthcare professional is available day to day. The return to play period can be shorter for those following the Enhanced Care pathway. Players aged 16 years or under can never follow the Enhanced Care pathway. Includes a section on multiple/ repeated concussions.
Rugby Football Union (England)	Yes	Concussion not mentioned on homepage. Two steps: 1. Click Run from top banner on home page; 2. Select HEADCASE under drop-down menu for 'Player Welfare': UK Guidelines are listed near bottom of webpage.	HEADCASE 'Extended Guidelines. Information, guidance and resources on how to recognise and manage a concussion' (September 2023) downloadable from HEADCASE webpage.	HEADCASE resources aligned with the UK Guidelines. Includes a section on multiple/ repeated concussions.

3.4 How have the UK Guidelines been implemented? Perceptions of key stakeholders involved in the development or dissemination of the UK Guidelines

Our analysis of interviews with key stakeholders involved in the development or dissemination of the UK Guidelines identified six broad themes around support for the guidelines, their accessibility, readability, target groups, communication, variable implementation and participation of the health sector. We discuss each in turn.

3.4.1 Stakeholders widely supported the UK Guidelines

Interview participants were, on the whole, very supportive of the UK Guidelines. There was broad consensus that they were based on the best available evidence and that they filled an important gap by providing consistent, unifying advice and messaging across sports.

> *[T]he real strength of this document is, that it is pan sport. So, Johnny, who plays cricket on a Sunday, and then rugby on Monday – it's the same guidance. And I think that's the key message, really, that Government needs to push out as well.* [I-20]

There was positive feedback for the utility of the UK Guidelines for raising awareness of the risks of concussion in sport and knowledge of the actions to take following a suspected concussion. Many said that they felt that the strapline 'If in doubt, sit them out' was simple and clear, and, anecdotally, they believed that individuals were now more aware of the dangers of returning to sport too early following a suspected concussion.

> *Lower down the scale at grassroots, clubs, and welfare officers seem to be treating this with the gravitas that it deserves. So, I think it has helped. I think the simplification of the [UK] Guidelines has definitely helped, and people are more willing now to talk about this or to put it into practice.* [I-15]

Participants also saw the UK Guidelines as an enabler for NGBs to better carry out their roles and responsibilities. For example, NGB interviews suggested that the guidelines provided a framework from which to develop and review their own sport-specific guidance and some participants emphasised that they enabled NGBs and others to better protect their players and coaches by providing them with the lever to enforce their duty of care. For example, one participant discussed how they signposted a parent, who had argued against a decision to remove their child from competition for a suspected concussion, to the UK Guidelines to justify the actions taken.

> *[P]rior to [the launch of the UK Guidelines], I think if you had someone who was a bit rogue and didn't want to take time off after they've had a clear concussion; you could get away with it easier, whereas now it's much easier, I think, to protect young people's brains.... I think we can't underestimate the importance of having a national document to help with that.* [I-13]

3.4.2 Accessibility and readability: a long and 'over technical' document

While the guidelines received widespread support, there were more mixed views on the accessibility of the language and format of the document. Although interview participants thought that they were clear and well written, emphasising the clarity of the strapline 'If in doubt, sit them out' as noted above, most felt that the document was too long, and the language was perceived to be technical and "challenging" for the intended audiences. The return to activity (education/work) and sport section was considered to be particularly difficult to engage with.

> *[T]he return to play, I think, is really helpful to guide people. But it's the bit that everybody gets really caught on in terms of how difficult it is to decide exactly what day and under what circumstances somebody can progress in those return to play [...] the 14 days is a really hard concept for people, I think. I'm not*

> *saying it's wrong. But I think helping people to understand what that means when they're calculating. […] And some people want, I feel like with Covid, they want to know like, what time does that day start? Is that you know at midnight? Or is it from the time of the injury? […] It's quite hard to be something that you can back up in detail and be really clear if somebody's got a detailed question, but simple enough for everybody to follow.* [I-12]

Where symptoms persisted, there was a reported lack of clarity about when to advise individuals to consult a healthcare professional. The UK Guidelines state that: "If symptoms persist for more than 28 days, individuals need to be assessed by an appropriate Healthcare Professional – typically their GP".[15 (p. 16)] But this recommendation was not seen to be straightforward by some:

> *[…] if you do experience symptoms for 14 days, should we push you towards medic, or do you… medically, should you leave it the full 28 [days]…. It's our best time to ask other questions. But the idea being where possible, you want people to get back to sport on their own terms without having to call a doctor.* [I-6]

There was some concern that the length of the document limited its accessibility and as such, the UK Guidelines might not be read in full by busy teachers, trainers, coaches, or parents.

> *[I]f it was a parent trying, you know, if [the guidance] is just on a website of a sport [organisation], and as a parent, you want to read it. I don't think they're the most engaging in terms of, you know, it's just a … 16/17-page document, with a lot of words, you know, it's not really very interactive.* [I-14]

Several interview participants linked the perceived accessibility challenges of the UK Guidelines to a lack of engaging and testing of the guidelines with the intended audiences. It was noted that neither those responsible for implementing the UK Guidelines within their organisations, nor those participating in grassroots sport had been consulted prior to publication. Several study participants considered that the guideline drafting group was weighted towards clinical expertise.[(b)] It was suggested that instead there could have been more systematic input from other stakeholders, for example, involving a smaller drafting group supported by a series of consensus building exercises with a much wider range of stakeholders.

> *We really need to get some focus groups going to say, OK, here's the advice, read it, what do you think that means? Because I do worry that some of the language sometimes is/ might be a bit exclusive […] you made brilliant guidance but very impenetrable to the average person.* [I-16]

Study participants agreed that the UK Guidelines were hard to find for people who were not aware of them. Some felt that the majority of the public and sports clubs were not aware of the guidelines as there had not been any national or local publicity.

> *[H]ow findable and searchable this is. We can all put it on our respective websites, and I hope we all have. But that doesn't make it immediately and readily accessible to people who've got an issue and want to find some information or advice online. I wonder how far down the proverbial Google search this would be.* [I-23]

There was agreement that more work was required to ensure the UK Guidelines were accessible to a broad audience. Participants suggested different ideas on what could be done including: tailoring versions for different audiences and shortening them, for example, creating a pocket guide or one-page poster or leaflet; using other media to convey the message, such as videos at sporting events or within popular TV programmes; and providing technical solutions to support the return to activity (education/work) and sport such as an app supporting different care pathways.

(d) The drafting group's constituency was in line with its Terms of Reference.

3.4.3 Stakeholders varied in their understanding of who the UK Guidelines are for and who is meant to act

While most interview participants agreed about who they thought the UK Guidelines were for, there were some areas of divergence over intended audiences and roles.

The majority of study participants considered that the UK Guidelines were aimed at everyone involved in grassroots sport, although some felt that the guidelines were primarily aimed at children. This perception was driven, largely, by the design of the document, with one participant pointing out that the photographs included in it were mostly of schoolchildren. Participants from the education sector queried the perception that the guidelines were intended to be used in schools, as schools and teachers were seen to be an area that was missing.

> *[T]his is for, if you like, really going straight to Saturday afternoon football, Sunday morning football parents on the sidelines rather than – it does mention teachers – but not the whole school.* [I-8]

Several study participants discussed the challenges of defining the 'grassroots' in their context. It was noted that many settings, including at semi-professional and professional levels, lacked access to the medical care needed to adequately assess concussion or support an enhanced recovery pathway. In light of this, some NGBs have applied the UK Guidelines across all settings where suitable medical care is not available.

> *I think it feels relatively clear for us now where the demarcations are, which was our initial difficulty with [the UK Guidelines]. What is grassroots? What isn't grassroots? And so now I think we very much related that to the standard care that is available to that person rather than any particular level or classification. And that feels comfortable now.* [I-12]

Some participants further questioned whether and to what degree the UK Guidelines should reach beyond the organised sports sector. The decision to disseminate the guidelines primarily through the NGBs was taken to imply that the guidelines were mainly aimed at people participating in organised sport. However, there was some concern that this would miss the large number of people who take part in recreational sports or physical activity not linked to an NGB. The example of people playing sports as a casual weekend activity was frequently referred to in interviews.

> *[P]laying football in the park on a Sunday with your mates, you would define as a sport, and they're as likely to get a concussion from there as not. So you know again how long they take off from playing with their mates in the park on a Sunday is equally as important as a you know assembly organised game where they're playing Sunday League football.* [I-18]

There were also differences in views on whether the UK Guidelines were intended as a self-management tool or primarily aimed at those who are responsible for the welfare of players. While most thought that everybody was responsible for taking action (coaches, parents, players, etc.), one participant considered that the UK Guidelines were aimed solely at sports participants as they are *"… effectively self-management guidelines… a set of guidelines which allowed people, for the most part, to self-care"* [I-16], while another stated that they were aimed solely at coaches.

> *[Guidelines are] not aimed at individual participants. The title of the work will give you a clue to that – "if in doubt, sit them out" – and the use of the third person as in "them", suggests that this is aimed at people who are making the decisions on the welfare of individuals rather than individuals themselves.* [I-23]

3.4.4 Perceived lack of a visible or explicit communication strategy

The lack of a visible communication strategy was identified as a key challenge by interview participants. Most felt that there had been a

strong focus on the launch of the UK Guidelines, and that this might have come at the expense of a longer-term strategy to develop broader awareness campaigns and so ensure wide dissemination. Several suggested that the lack of a broader campaign had been a missed opportunity to increase public awareness around the risk of concussion, how to identify a concussion and the immediate actions to take. They considered that while there was increasing visibility of concussion in sport as a result of national conversations around high-risk sports, people participating in sports at the grassroots would not be aware of the UK Guidelines and that they would not be aware of their own risk of sustaining a concussion.

A number of interview participants highlighted a lack of meaningful funding as an important barrier to effectively communicate and disseminate the UK Guidelines (*"There's not been the resource to do that"* [I-4]).

> *I think the amount of money that was actually assigned to the distribution of the guidelines [...] was never going to touch the size of the need.* [I-6]

Several participants linked this lack of sufficient funding to a perceived lack of clear responsibility for guideline implementation. In principle, the guidelines communication group, convened by the Sport and Recreation Alliance, was tasked with designing and implementing plans for guideline communication[29] as mentioned above; yet, in practice, limited resources undermined efforts for effective communication and dissemination.

> *[B]ut the reality is, no one was really charged with it [publicising the guidelines]. Nobody was responsible for the implementation. Nobody had a budget. And so 'let [Sport and Recreation Alliance] do it'.* [I-24]

Some NGB participants also felt that communication about when the UK Guidelines would be published, frequency of updates and, importantly, what was expected of NGBs in terms of dissemination had been poor, and that this had influenced their own progress on implementing tailored concussion policies.

3.4.5 UK Guidelines implementation varied across NGBs

Interview participants described a degree of variation in how the UK Guidelines were implemented across NGBs. This included how NGBs aligned their concussion advice and procedures with the UK Guidelines, and the range of tools and resources to support implementation. Study participants also raised questions around accountability.

Alignment of NGB concussion advice and procedures with the UK Guidelines

As discussed in Section 3.3 and presented in Table 3, the implementation of the UK Guidelines varied across the six sports examined. NGBs participating in interviews varied in their perceptions of the extent to which their own tailored guidance needed to align with the UK Guidelines. Some thought that their existing guidance was sufficiently aligned and did not warrant updating. This view was, in part, shaped by wider considerations of member welfare (*"...sitting on [existing guidance] until [NGB had] reviewed their health and safety policies as [NGB] did not want to confuse [its members] by having 'two sets' [of guidelines]."* [I-15]). One NGB participant told us that they also needed to comply with their sports' international regulations and went beyond the requirements set by the UK Guidelines; therefore they considered their own guidance to be compliant. Others, such as the Rugby Football Union (see Table 3) had fully revisited and updated their guidance, using the UK Guidelines as an opportunity to relaunch and re-engage their members in the issue. The main changes they made were to harmonise advice for adult and youth players.

NGB tools and resources to support access to concussion guidance and training

Several NGBs have developed a range of tools, including tailored handouts for different audiences and education or training materials to support their members in accessing concussion guidance and training; they also

incorporated concussion modules into their coaching training (Table 4).

In most cases, the development of many of these materials preceded the publication of the UK Guidelines. For example, the Rugby Football Union developed a range of concussion resources within their HEADCASE programme, first introduced in 2013, and formed part of a cross-sport group who came together to support each other and share resources.

The level of activity in developing resources likely reflects the level of perceived risk of sustaining a concussion in the relevant sport and the priority that is placed on concussion relative to other issues, as well as the capacity of the NGB to engage in such activities. For example, on risk awareness, one NGB considered their sport to be associated with a high risk for concussion but argued that this was not always fully understood at the grassroots level. This participant told us that their risk analyses with their grassroots members highlighted members' misconceptions about the effectiveness of protective equipment to prevent concussion type injuries.

> *They [coaches, players] went back to what you see on the television, you know the rugby head injury assessment, and the rumours about football and the odd boxer was being punched on the head type of issue. They were well, 'no, that can't possibly happen to us because we wear a helmet on the head'.* [I-7]

While all participants acknowledged concussion was an important issue, they highlighted the many competing issues they had to deal with. In the case of the NGB where the risk of concussion was considered to be high, there was a perceived degree of urgency to implement the UK Guidelines as soon as possible, and the participant said the development of sport-specific tools and resources to support awareness was a high priority. For other NGBs concussion was not seen as a high priority. This was especially the case for non-contact sports.

There was a view that small and poorly resourced sports lacked the capacity and resources to do as much. Some participants highlighted the challenges of dedicating funding to develop resources such as videos for concussion training, noting that it would be helpful if some free 'generic' materials could be made available in the near future.

> *We explored [training coaches for managing concussion] – and they're so expensive to design like. So the biggest impact one like I said, either we tap into a generic one – Sport England or someone designed it, and then we would have access to it. But designing it internally, we wouldn't have. We wouldn't have that resource.* [I-15]

Several interview participants considered a need for greater accountability mechanisms to encourage stakeholders to take action, for example through monitoring.

> *[...] the different sports probably [need] somebody, essentially DCMS, to say 'right, 'we've given you the document. What you're doing with this, Rugby? What are you doing with this, Football? What you're doing with this, Athletics? What you're doing with this, Cycling?* [I-21]

Participants pointed to efforts in Scotland to bring the sports together to publicly commit to act and to share learning to support efforts.

Finally, there was a strong perception among participants that much of the burden of responsibility around understanding and implementing the UK Guidelines rested with those working directly with the grassroots (sports coaches, welfare officers, teachers, etc.). Reflecting on this, some interview participants speculated that, outside of education, this group was most likely to include volunteers such as parents with varied 'unregulated' training and development histories. Having a perceived "extra level of responsibility" around concussion was viewed as possibly "too much" to take on and a potential risk to the recruitment and retention of volunteers to the sport.

Table 4. Examples of tools developed by the six priority sports to support members accessing concussion guidance and training

British Gymnastics	Swim England	British Taekwondo	England Football	England Hockey	England Rugby
Five concussion resources (one-pagers) available for download on the concussion guidance webpage: • Key guidance points • How to recognise a concussion • How to respond to a suspected concussion • Gymnasts – what do I need to know? • Parents/carers – what do I need to know?	Summary document 'If in doubt, sit them out!' available for download.	Coach is responsible for completing Accident Report Form for all suspected concussions. CrashCourse Concussion Education programme uses material from TeachAids in collaboration with Standford University in the USA, with a focus on American Football and cycling, and offers a CashCourse Certification Quiz for people to complete after viewing the video course, and further materials, such as the CrashCourse Brain Fly-Through and the CrashCourse Concussion Story Wall	Concussion-related resources available on website include links to: • Free online training (requires signing up with the FA) • Concussion quiz • Concussion video "know the signs of concussion" • Statement of Concussion in Para Sport • Other resources including posters and social media resources	Provide links to UK Coaching e-learning module on "Concussion Awareness for Coaches" and links to the Concussion Recognition Tool CRT6.	All HEADCASE related resources are available for download, including: • HEADCASE Extended & Essential Guides • HEADCASE Graduated Return to Activity and Sport (GRAS) • Six different versions of HEADCASE e-learning based on role in rugby • HEADCASE Pitch-side Advice Card • HEADCASE Poster • Latest Concussion in Rugby Research • Concussion Recognition Tools

3.4.6 Participation of and impact on the health sector

Participants from the health sector told us that NHS Pathways (the clinical support system used by NHS 111 and 999[c] to triage patients) had updated its algorithm to account for the UK Guidelines and that the return to activity (education/work) component of the guidelines had been included in the discharge summary advice in the National Institute for Health and Care Excellence's (NICE's) guidelines on the assessment and early management of head injury.[56] However, many were of the opinion that the health sector had not embraced the guidelines and that outside of sports medicine there was limited awareness of the guidelines.

There was a perception held by many participants that GPs may not be aware of the UK Guidelines and this was reported to have resulted in conflicting advice. One NGB participant told us that parents frequently sought advice from their GP if their child had a suspected concussion, and citied anecdotal evidence that GPs were giving parents guidance different to that given by the coach, potentially undermining the coach's authority.

> *[P]eople do go to the GP, and they're not aware of … those guidelines at all, and I've had parents contact me and say, 'Well, we've been to the doctors, and the doctor didn't mention these guidelines at all, and they said that they can go back and play on Saturday or Sunday.* [I-14]

It was suggested that sport-related concussion was not necessarily perceived as a high priority in the NHS as it was not seen to pose a particular burden on primary and emergency care; therefore, it was perhaps taking longer than expected to get the guidelines embedded in practice. Health sector interview participants told us that the return to activity (education/work) advice was helpful and that there would potentially be increased uptake if it was included as part of a package of support alongside advice on what to do for other groups experiencing a non-sport related concussion.

> *So we've got elderly people who fall. We've got road traffic collisions. We've got people who get drunk at the pub and punch each other, you know, just as examples. And clearly a [sport-related] concussion guideline does not speak to that cohort, those cohorts of patients telling Myrtle who's 90 and falling down the stairs that […] it'll take a three weeks to go back to sport is meaningless for her. […] Yeah, we've got great concussion guidelines there for sports. But if we have it for our other cohorts, then [it] becomes easier for the jobbing emergency physician to think, okay, I send someone home. They need guidelines. Which of the two guidelines is appropriate for them?* [I-13]

The UK Guidelines recommend that in case of a suspected concussion, the player should be immediately removed from play, in line with the strapline 'If in doubt, sit them out'. They further recommend for the player to "get assessed by an appropriate Healthcare Professional onsite or access the National Health Service (NHS) by calling 111 within 24 hours of the incident".[15 (p. 12)] There was an expectation among some interview participants that by using the strapline and signposting to NHS 111, players without red flag symptoms would not have to seek further assessment and care, thereby reducing the burden on the NHS and, in particular, primary care. There was some debate however whether this was indeed likely to be the case. Some participants suggested that by signposting NHS 111, more people might actually be referred to emergency care by a 'risk averse' NHS. However, participants from the health sector suggested that NHS 111 was implementing the UK Guidelines. This means that even if NHS 111 was over-triaging people with mild head injuries for a clinical assessment (who would then be discharged to self-care in line with the UK Guidelines), this was not necessarily seen as problematic, as head injuries do not account for a large number of calls.

(c) 'NHS 111' is a free-to-call, single non-emergency number medical helpline operating in England, Scotland (NHS24) and Wales; '999' is the official emergency telephone number for the United Kingdom.

3.5 Awareness and knowledge of the UK Guidelines: survey of members of British Gymnastics

The survey of members of British Gymnastics yielded 289 valid responses (out of a total of 370 responses), which were included in the analysis. Table 5 presents an overview of survey respondents. The majority of respondents were parents and carers (n=188; 65%), followed by coaches (n=34) and welfare officers (n=10), who together accounted for 15.2% of participants. Just under 13% of respondents were gymnasts aged 11-15 years (37), with gymnasts aged 16 years and over accounting for the remaining 6.9% of respondents (n=20).

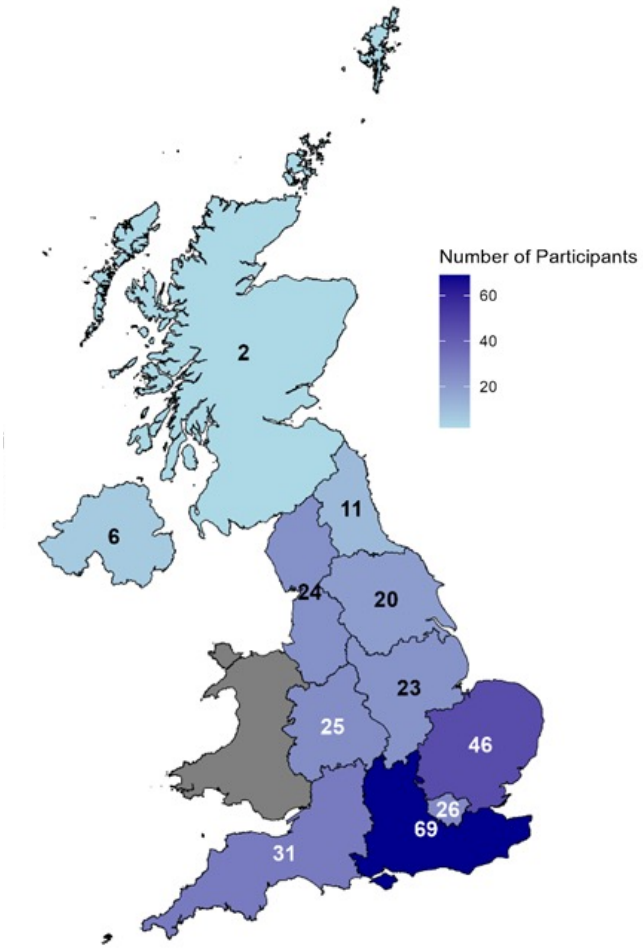
Table 5. Survey respondents

Respondent Group (N)	Total number of participants N (% of participants)
Coach	34 (11.8%)
Welfare officer	10 (3.5%)
Gymnast aged 11-15	37 (12.8%)
Parent/carer	188 (65.1%)
Gymnast aged 16 and over	20 (6.9%)
Total	**289 (100%)**

For the remainder of this chapter, we report the results by three groups: (i) coaches and welfare officers; (ii) parents/carers of gymnasts and gymnasts aged 16 years and over; and (iii) gymnasts aged 11-15 years. We combined parents/carers of gymnasts and gymnasts aged 16 years and over because they have similar responsibilities regarding post-concussion management as per UK Guidelines. As such, the surveys administered to both groups contained largely the same questions.

Survey respondents' clubs were comparatively equally distributed across England, with a slightly higher representation of clubs in the South-East of England (Figure 3).[d]

Figure 3. Geographical distribution of survey respondents' clubs



(d) The survey also captured six clubs in Northern Ireland and two in Scotland (none in Wales), but in line with the aims of this work we only report findings from respondents located in England.

A descriptive summary of respondent groups' key demographics is presented in Appendix 4.

The majority of coaches and welfare officers were between 25 and 44 years of age, with 12 (27.3%) aged 25-34 years and 11 (25.0%) aged 35-44 years. Most respondents were female (34; 77.3%), and the majority identified as White (37, 84.1%). Over half of the respondents (23; 52.3%) had more than 10 years of experience in their roles. The majority (27; 61.4%) held paid positions, and among them, 23 (85.2%) were employed; the majority also worked part-time (33; 75.0%). Coaching qualifications varied, eight (23.5%) had a UKCC Level 2 certification as their highest qualification, and 12 (35.5%) were working with gymnasts competing at national or international levels.

Most gymnasts aged between 11 and 15 years were female (32; 86.5%). Of these, more than half (21; 56.8%) had between 5-9 years of experience, and around three-quarters (28; 75.7%) trained several times a week. Over half (20; 54.1%) competed at school, club, or regional levels, while 37.8% (14) competed at national or international levels.

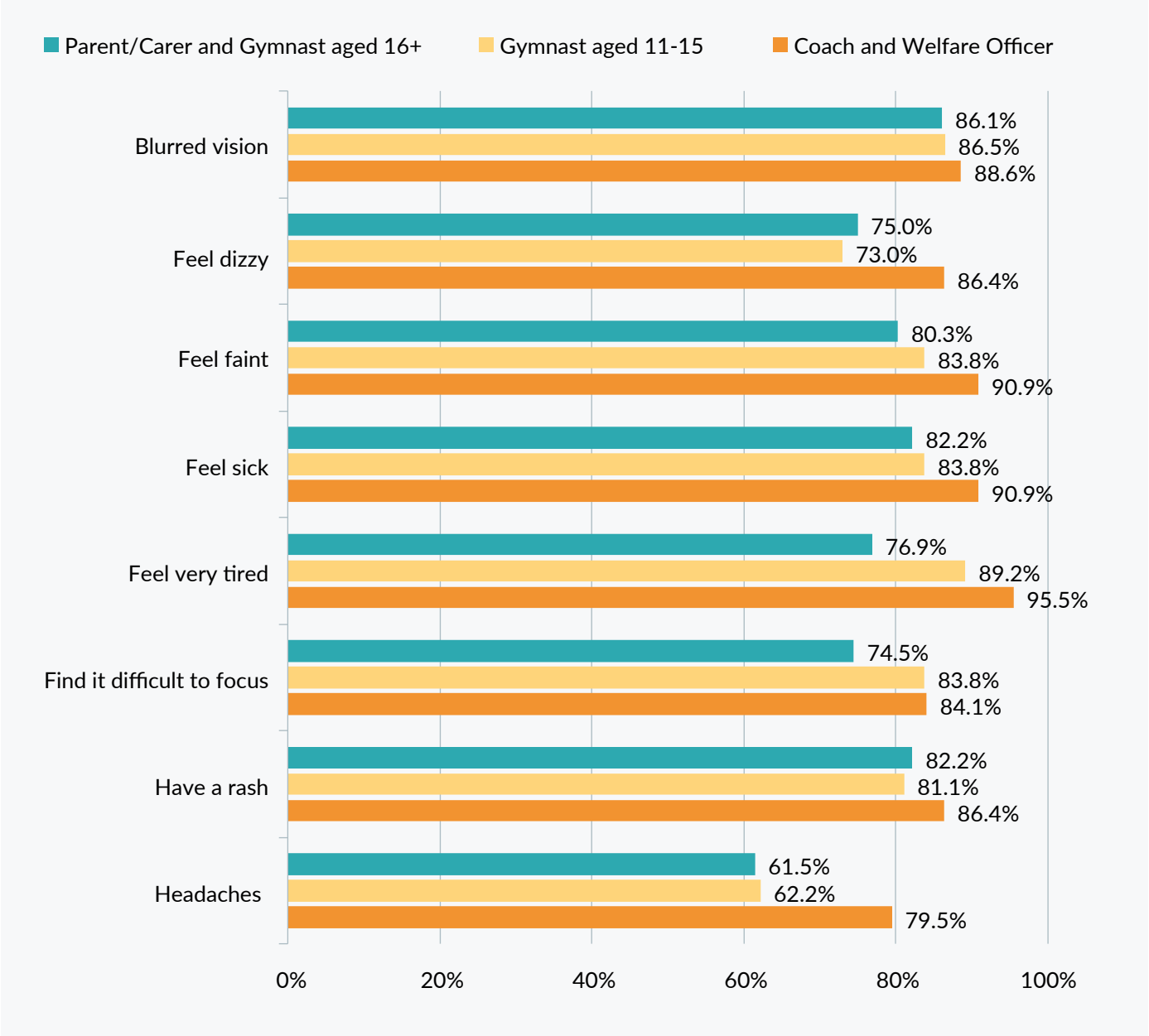
The majority of parents/carers were aged 35-44 years (116; 61.7%). Most were female (170; 90.4%) and identified as White (160; 85.1%). According to their parents/carers, over half of the gymnasts aged under 11 years of age (102; 54.3%) did not participate in competitive gymnastics, and most engaged in the sport only once a week (137; 72.9%). A majority also participated in other sports, with swimming being the most common (68; 36.2%), followed by football (28; 14.9%) and dance (20; 10.6%).

Among gymnasts aged 16 and over, most were 16-24 years of age (17; 85%), female (17; 85%) and identified as White (16; 80%). Half of this group had over 10 years of experience in gymnastics, while only one respondent had less than one year of experience. Most respondents practiced gymnastics several times a week (17; 85%), and nine (45%) had competed at the national or international level. Twelve respondents in this group (60%) did not engage in other regular sports, while the remaining 40% (8) participated in activities such as football, swimming, dance, and tennis.

3.5.1 Survey respondents demonstrated a high level of knowledge about concussion

The stated levels of knowledge about concussion were high, with over 90% of participants identifying the correct definition of concussion and over 70% correctly recognising seven out of eight listed symptoms across all participant groups. The majority of survey respondents who said that they understood what a concussion is (92.6%) correctly identified a concussion as an injury to the brain (94.8%). As shown in Figure 4, when asked about the symptoms of concussion, over 70% of survey respondents correctly described that most symptoms (except for headaches) could occur sometimes. There was some variation by symptom, with, for example, two-thirds of respondents (64.3%) recognising that a headache may occur sometimes while 34.9% incorrectly believed that headaches always occur following a concussion. Additionally, 82.7% of respondents correctly identified that having a rash is not a symptom of concussion. Coaches and welfare officers consistently presented a higher percentage of correct responses across all listed symptoms.

Figure 4. Proportion of survey respondents correctly identifying concussion symptoms (by respondent group)



3.5.2 Perceptions of risk of concussion in gymnastics varied across activities

Among all respondents, 21 gymnasts (7.3%) reported having experienced a concussion. This was either self-reported or recognised by a coach, welfare officer, or parent/carer. Of these, 13 gymnasts (61.9%) reported having experienced multiple concussions. A number of respondents (16; 6.5%) of parents/carers and gymnasts aged 11-15 believed that other gymnasts in their (child's) club had sustained a concussion.

When asked about the gymnastics activities that were perceived as posing a greater risk for concussion, activities involving the bar (horizontal, parallel, uneven) were perceived to pose the highest concussion risk by 190 respondents (65.7%). Over half of respondents also considered beam, trampoline (individual, synchronised, double mini), tumbling, vault, and acrobatics to carry substantial concussion risks. Conversely, rhythmic exercises (hoop, ball, clubs, ribbon, rope) were viewed as risky by a small number of survey respondents (32; 11.1%).

3.5.3 Knowledge about rest and return to daily activities was higher among coaches and welfare officers compared to other groups

Coaches and welfare officers generally showed a better understanding of the appropriate actions to take following a suspected concussion. More than half of respondents (60.2%) correctly said that gymnasts should stop training immediately. The vast majority of coaches and welfare officers (42; 95.5%) and 63.5% of parents/carers and gymnasts aged 16 years and over (132) gave the correct response. In contrast, none of the gymnasts aged 11-15 years did; most in this group (34; 91.5%) believed that the decision to stop training should be made by coaches and welfare officers. In addition, over 70% in this group stated that they would recommend stopping exercise and informing an adult, such as a coach, if they or another gymnast sustained a head injury and showed signs of a concussion.

Considering actions following a suspected concussion, most (90.9%) coaches and welfare officers believed that a parent or carer should accompany the gymnast for 24 hours (Table 6). Some 63.6% supported limiting screen time and avoiding loud music during the rest. All coaches and welfare officers confirmed that they would complete the relevant injury report following a suspected concussion, and 77.3% stated they would advise the parent or carer to seek medical assessment on-site or contact NHS 111 within 24 hours, rather than waiting for symptoms to worsen.

Among gymnasts aged 11-15 years, the vast majority (94.6%) reported that they would inform a parent or carer if they had a suspected concussion, while 54.1% indicated they would rest for two days and limit their screen time as part of their recovery. Among parents and carers, 85.1% stated they would stay with the gymnast for 24 hours following a concussion, while 57.4% would seek immediate medical assessment on-site or call NHS 111 within 24 hours, compared to 42.6% who would take the gymnast directly to A&E.

Additionally, over half (52.7%) would ensure that the gymnast limits screen time during rest. Among gymnasts aged 16 and over, all respondents said that they would stop exercising immediately and report their injury to a coach, medical staff, or parent. Over half (60%) stated they would seek medical assessment on-site or call NHS 111 within 24 hours, while 40% would go directly to A&E. However, only 10% would limit screen time, and 45% would rest without any gymnastics even if they felt fine.

Table 6. Preferred action following a suspected concussion

Respondent group	Preferred action	Number (%)
Coach and welfare officer (N = 44)	a) Advise parent/carer they should not be left alone for the next 24 hours.	4 (9.1%)
	b) Advise parent/carer they should not be left alone for the next 12 hours.	40 (90.9%)
	a) Advise them to rest and sleep for the first 2 days and not take part in any gymnastics even if they feel fine.	36 (81.8%)
	b) Advise them to rest and sleep for the first 2 days and only take part in gymnastics if they feel fine.	8 (18.2%)
	a) Advise them to limit the amount of screentime (e.g. not watch TV, use a computer or their smartphone) and avoid loud noises such as music for at least 2 days.	28 (63.6%)
	b) Advise them to avoid their use of screens (e.g. TV, computer, smartphone or tablet) only if it makes their symptoms worse.	16 (36.4%)
	a) Ensure any relevant injury report form is completed.	44 (100%)
	b) Only complete an injury form if concussion has been confirmed by a health professional.	0 (0%)
	a) Advise parent/carer they should be assessed by an appropriate healthcare professional on site or call NHS 111 within 24 hours.	34 (77.3%)
	b) Advise parent/carer they should be assessed by an appropriate healthcare professional on site or call NHS 111 if symptoms get worse.	10 (22.7%)
Gymnast aged 11-15 (N = 37)	a) I would tell my parent/carer that I have hurt my head and may have a concussion.	35 (94.6%)
	b) I would carry on as normal but tell my parent/carer if I started to feel poorly.	2 (5.4%)
	a) I would try to minimise the amount of time I watch TV, use my computer/smartphone/tablet for the next two days.	20 (54.1%)
	b) I would carry on as normal and only avoid watching TV, using my computer/smartphone/tablet if it makes me feel ill.	17 (45.9%)
	a) I would rest for the next two days and not take part in any gymnastics even if I felt fine.	20 (54.1%)
	b) I would rest for the next two days and only take part in gymnastics if I felt fine.	17 (45.9%)

Table 6. Preferred action following a suspected concussion

Respondent group	Preferred action	Number (%)
Parent/ carer (N = 188)	a) I would stay with them for the next 24 hours.	160 (85.1%)
	b) I would stay with them for the next 12 hours.	28 (14.9%)
	a) I would have them assessed by an appropriate healthcare professional on site or call NHS 111 in the next 24 hours.	108 (57.4%)
	b) I would take them to A&E for an assessment.	80 (42.6%)
	a) I would limit their smartphone and screen use for the next 24-48 hours.	99 (52.7%)
	b) I would let them rest in the way they want for the next 24-48 hours.	89 (47.3%)
Gymnast aged 16 and over (N = 20)	a) I would stop exercising immediately and report my symptoms to my coach/a medic/my parents.	20 (100%)
	b) I do not to say anything if I feel fine.	0 (0%)
	a) I would go to an appropriate healthcare professional on site for an assessment or call NHS 111 in the next 24 hours.	12 (60%)
	b) I go to A&E for an assessment.	8 (40%)
	a) I would limit my smartphone and screen use for the next 24-48 hours.	2 (10%)
	b) I would rest for the next 24-48 hours.	18 (90%)
	a) I would rest for the next two days and not take part in any gymnastics even if I felt fine.	9 (45%)
	b) I would rest for the next two days and only take part in gymnastics if I felt fine.	11 (55%)

3.5.4 Knowledge about appropriate timelines for return to education/work and sport after concussion was limited

Survey respondents' knowledge about appropriate timelines for returning to school, work, training, and competition following a concussion was limited across all groups.

Among coaches and welfare officers, parents/carers and gymnasts aged 16 years and over, only 16.7% (42 out of 252) correctly identified that gymnasts should not return to school or work immediately after becoming symptom-free. The proportion of correct responses was similar across these two groups.

Most respondents showed limited understanding of the recommended timeframe for returning to activities with a risk of head injury after becoming symptom-free. Over one-third of respondents (105, 36.3%) stated 'not sure/don't know' and only 10.4% (30) correctly selected 14 days. Over 40% (125) incorrectly believed it should be fewer than 14 days. Among coaches and welfare officers, the proportion of correct responses was 6.8% (3), while among gymnasts aged 11-15 years this was 5.4% (2). Parents/carers and gymnasts aged 16 and over had a slightly higher proportion at 12% (25) selecting the correct response.

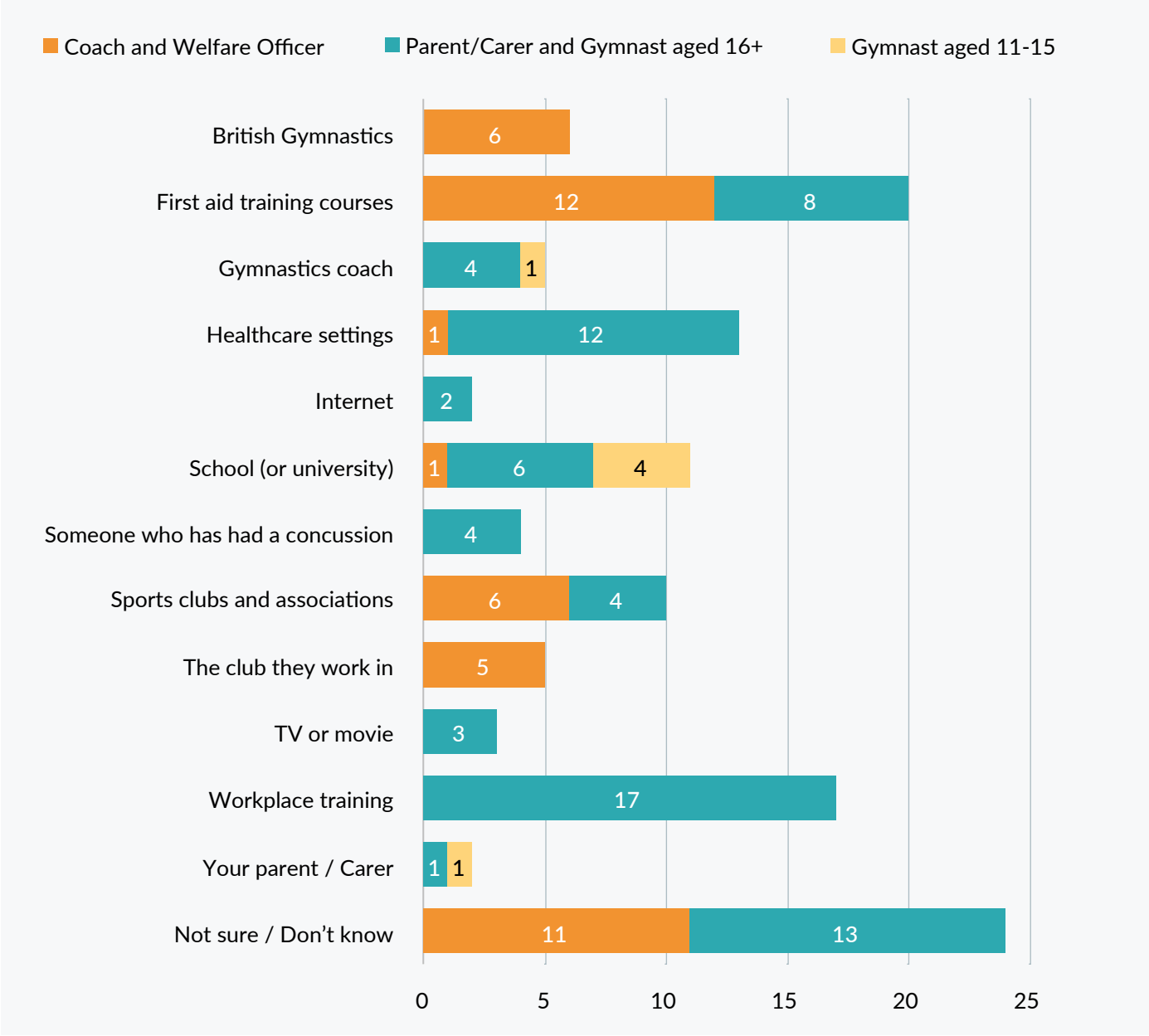
Knowledge about the appropriate return-to-competition timeline was also low, with only 16 respondents (5.5%) correctly identifying 21 days as the minimum required period after being symptom-free. A substantial number (120, 41.5%) stated 'not sure/don't know'. Coaches and welfare officers were most likely to select the correct response (6, 13.6%) compared to gymnasts aged 11-15 (2, 5.4%) and parents/carers and gymnasts aged 16 and over (8, 3.8%).

3.5.5 Concussion-related education and training was generally low

Just over one-quarter of survey respondents (81, 28.0%) reported having received concussion-related training. Among these, the majority (63 respondents) had received training both on recognising symptoms and taking appropriate actions (coaches and welfare officers: 22; parents/carers and gymnasts aged 16 years and over: 39; gymnasts aged 11-15 years: 2).

Among the 81 participants who reported having received concussion-related training, the sources varied across the three respondent groups (Figure 5). The most common source of training reported by coaches and welfare officers was first aid training courses (12). This was followed by British Gymnastics and sports clubs or associations, with six participants each claiming these as their training sources. Five respondents reported having received training from the club where they work, while 11 participants did not remember the training provider.

Figure 5. Providers of concussion-related training by respondent group



Among parents/carers and gymnasts aged 16 years and over, the most frequently mentioned source was workplace training (17), followed by healthcare settings (12) and first aid training (8). Six respondents reported having received training in school or university settings and four mentioned a gymnastics coach, sports clubs or associations, and someone with previous concussion experience. Less common sources included television or movies (3), the internet (2), and another member of the gymnastics club (1).

Among gymnasts aged 11-15 years, schools were the predominant source of training, with four participants identifying this as their training provider. Only one participant each reported having received training from a gymnastics coach or from their parent or carer.

3.5.6 Guideline recognition was low but was linked to greater confidence in identifying and managing concussion

Recognition of the strapline 'If in doubt, sit them out'

Just over 40% of survey respondents recognised the strapline "If in doubt, sit them out" (121; 41.9%). The strapline was most commonly recognised by parents/carers and gymnasts aged 16 years and over (103; 49.5%),

followed by gymnasts aged 11-15 years (16; 43.2%). Among coaches and welfare officers, only two respondents (4.5%) recognised the strapline.

Understanding of the meaning of the strapline varied between groups. Over three quarters of respondents (219; 75.8%) correctly identified that the strapline meant that anyone with a suspected concussion should stop participating and must not take part in any further activities. Of those who provided the correct answer, forty were coaches and welfare officers (90.9% of coaches and welfare officers), 155 were parents/carers and gymnasts aged 16 years and over (74.5% within this group), and 24 were gymnasts aged 11-15 years (64.9% within this group).

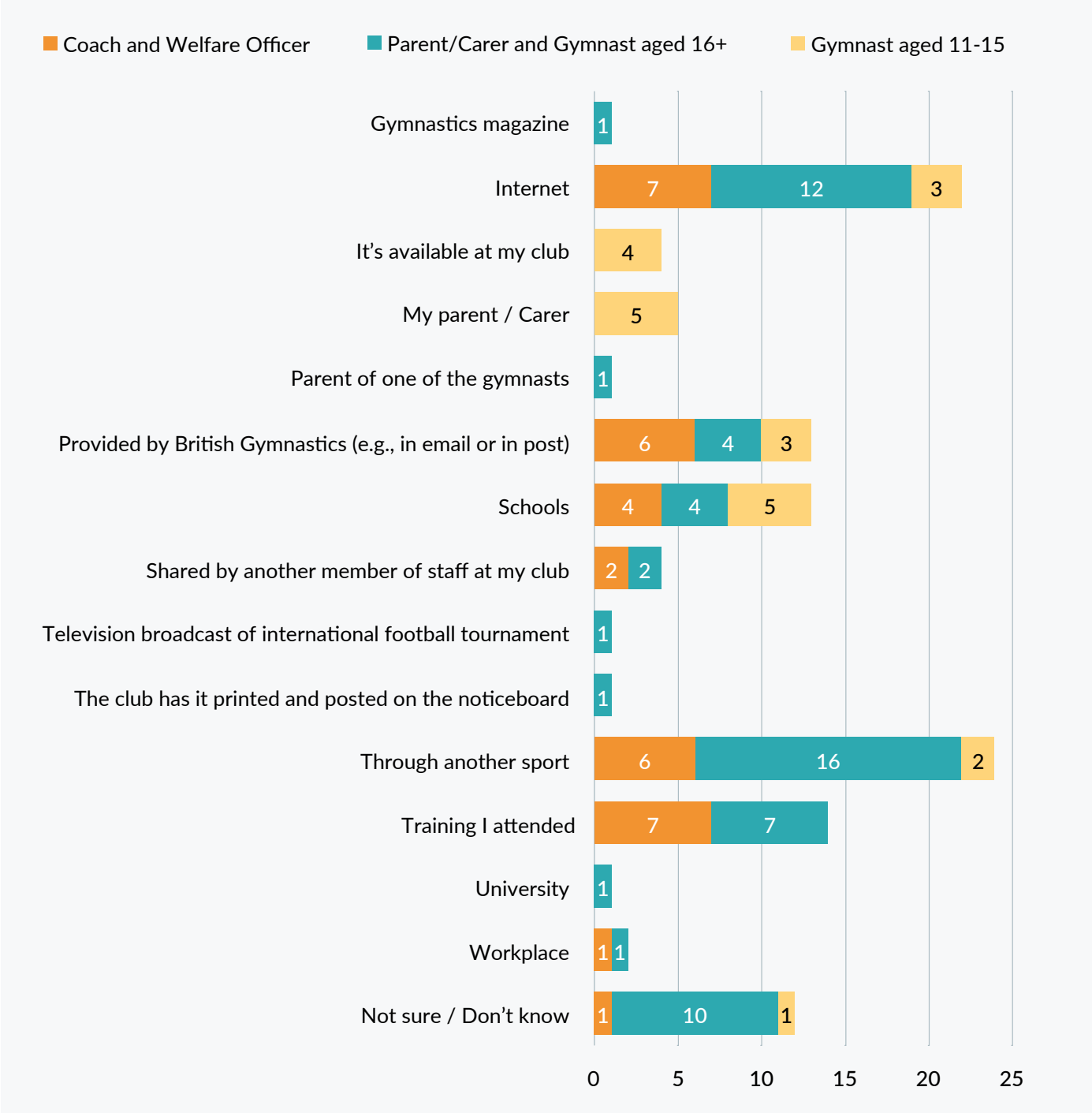
Recognition of concussion-related guidelines

Over two-thirds of respondents did not recognise any of the concussion guidelines presented in the survey (200; 69.2%). Of the 89 respondents who recognised at least one set of guidelines, coaches and welfare officers were most likely to do so, with 21 respondents (47.7% within this group) identifying at least one guideline. This was followed by gymnasts aged 11-15 years, where 12 respondents (32.4% within this group) recognised any guidelines. Among parents/carers and gymnasts aged 16 years and over, just under one-third (56; 29.8% within this group) reported recognising one or more guidelines.

The UK Guidelines were the most commonly recognised concussion guidelines; they were recognised by half of the respondents who did recognise any guidelines (44; 49.4%). This was followed by the British Gymnastics adapted version of the UK Guidelines, which was recognised by 40 respondents, and the England Football Concussion Guidelines, recognised by 34 respondents. Other guidelines presented in the survey were less commonly known. These included the Concussion Guidelines for the Education Sector,[57] the Sport Scotland Concussion Guidance,[58] and Concussion Recognise & Remove published by the Wales Rugby Union,[59] each of which was recognised by 21 respondents. The England Rugby Union's Headcase Extended Guidelines to Recognise and Manage a Concussion were recognised by 12 respondents.[60]

Figure 6 shows the sources that those respondents who did recognise any of the concussion guidelines presented to them cited. The most common source overall was participation in other sports, followed by the internet and the British Gymnastics website. Among coaches and welfare officers, the British Gymnastics website was the most frequently cited source (11), followed by the internet (7), training sessions (7), communications from British Gymnastics (such as by emails or posts) (6), and other sports (6). Among parents/carers and gymnasts aged 16 years and over, 'other sports' was the most common source (16), followed by the internet (12) and training sessions (7), emails or postal communications from British Gymnastics (4) and schools (4). Among gymnasts aged 11-15 years, schools (5) and parents or carers (5) were the most frequently cited sources of information; some also reported their sports clubs as a source (4).

Figure 6. Sources of concussion-related guidelines by respondent group



Use of the concussion-related guidelines

Among the 89 respondents who recognised at least one of the seven concussion guidelines presented to them, over half (51; 57.3%) reported having read the guideline. Having read the guidelines was most common among coaches and welfare officers (19; 90.5% within this group). Among both parents/carers and gymnasts aged 16 years and over, 50% (28 out of 56 respondents) and gymnasts aged 11-15 years (4 out of 8) had read at least one guideline.

Over half of the 89 respondents reported that they felt confident in recognising and managing a concussion based on concussion guidelines (51; 57.3%), but only 10 respondents (11.2%) reported feeling very confident. Thirteen respondents (14.6%) stated they did not feel very confident, and 15 (16.9%) said they were not sure.

The proportion of respondents who felt confident in recognising and managing a concussion was higher among those who had read the guidelines compared to those who had only recognised a concussion-related guideline. Focusing specifically on the 51 respondents who said that they had read any of the concussion guidelines, just under one-fifth (9; 17.6%) stated that they felt very confident in recognising and managing a concussion and over one-third (36; 70.6%) felt confident. The remainder felt either not very confident (5; 9.8%) or was unsure (1; 2.0%). Coaches and welfare officers tended to be the most confident, with 16 out of 21 participants (76.2% within this group) reporting confidence in recognising and managing concussions, followed by gymnasts aged 11-15 years (6; 75% within this group) and parents/carers and gymnasts aged 16 years and over (29; 51.8% within this group).

4 Summary and conclusions

This study sought to understand how the UK Concussion Guidelines for Non-Elite (Grassroots) Sport have been implemented and assess attitudes to and awareness of these guidelines within grassroots sport some 15-18 months after their publication. Focusing on six sports (football, rugby union, gymnastics, field hockey, swimming and taekwondo), we reviewed documents, spoke with 34 key stakeholders in 25 interviews and conducted a survey of members of British Gymnastics, with 289 valid responses. This section summarises the main findings from this work. We first set out the strengths and limitations of our study, followed by an overview of the key findings and setting these in context. We close by outlining a set of policy options for refining and improving the UK Guidelines in sport and other settings to ensure their wider implementation and uptake.

4.1 Strengths and limitations

We were able to recruit a broad range of key stakeholders to explore how the UK Guidelines have been implemented at national level and the support provided to implement the guidelines at the grassroots. To gain insight, we spoke with people involved in the drafting and/or dissemination of the guidelines and those who were meant to implement them, focusing on sports with different risks of concussion. We recognise that interview participants who were members of the guideline development and/or communication groups might have had a conflict of interest, and we sought to manage any such conflicts by ensuring confidentiality and being transparent. There is an inherent risk of bias in key informant interviews,[61] and we have addressed this primarily through structuring interview questions, triangulation with data from key informants not involved in the process and being mindful of these potential risks.

The UK Guidelines are aimed at the general public active in sports, but because of the ways in which the sector is structured, we were only able to consider the organised sector as represented by sports NGBs. Sports NGBs also formed the primary route through which the guidelines were to be disseminated, and our study therefore provides an important step to understanding how they were understood and adopted at national level. As a next step, it would be important to conduct in-depth research at the grassroots, including local sports, local government and public health representatives, to capture views within and outside of organised sports.

Our survey of members of British Gymnastics captured insights from across England, with a slightly higher representation of clubs in the South-East. The survey instrument was based on a comprehensive review of the literature, and we conducted cognitive interviews with young people to ensure comprehension and applicability to this demographic. A limitation is that we only fielded the survey to participants in one sport although its robust development makes it a useful resource that could be adapted and fielded with other sports. As noted in Section 2.6, at the time of conducting this research, British Gymnastics was the only sport among the six sports examined who had implemented a concussion policy for the first time as a direct response to the UK Guidelines. Therefore, our findings provide insight into a context where pre-existing knowledge was potentially low.

The overall response to the survey was lower than anticipated. This is likely to be explained, largely, by the method of survey dissemination. It was included at the end of the British Gymnastics newsletter distributed to members by email, and it is possible that

members may not have recognised or seen the survey information and link. Subsequent reminders followed the same format, which may have limited visibility and engagement. The majority of the respondents to the survey were female and identified as White. Although we do not have access to a breakdown of British Gymnastics members by gender, age and ethnicity, this is likely to reflect broader participation activities as documented for example in the Active Lives Adult and Children Surveys.[27]

Finally, we note that the study captured experiences of between 15 and 18 months after the publication of the UK Guidelines. It could be argued that this timeframe might be too short to capture meaningful implementation of the guidelines at the grassroots. At the same time, the timeframe should have been sufficient for the main national stakeholders to act upon implementing the UK Guidelines at national level, which was the focus of this study, and we are confident that the data we have collected as part of this work have captured these experiences.

4.2 Overview of key findings in context

Our study confirmed widespread support of the UK Guidelines. They were seen to fill an important gap by providing consistent messaging across sports. This was especially welcomed by those engaged in in more than one sport. NGBs emphasised the value of the guidelines in helping them to better enact their 'duty of care' to their players and coaches and to raise awareness of concussion at grassroots level. A further indication of the widespread support of the UK Guidelines is their adoption by all four UK nations. In addition, both Australia[62] and New Zealand[63] have recently aligned their national concussion guidelines with the UK Guidelines in an effort to ensure clarity and consistency across sports and enable a "strong international consensus".[62 (p. 3)] There may be a role for the UK to advocate for the guidance to be adopted more widely to support greater diffusion.

While the UK Guidelines were broadly welcomed, views differed on guideline accessibility and readability. Concerns such as document length and technical language were raised by some stakeholders, and the return to activity (education/work) and sport section was noted to be sometimes difficult to follow. Additionally, there appeared to be a lack of clarity about when to advise individuals to consult a health professional, particularly in the 28-day period following a concussion. There was a perception that the guidelines could be hard to access as they were not easy to find on sports and health websites.

There were also different views on how the UK Guidelines were intended to be used, that is, whether the guidelines were primarily a self-management tool for individuals or a tool for coaches and those with responsibilities for the welfare of players. Some participants raised questions about whether the guidelines were aimed at just the grassroots level or other 'elite' level organised sports that did not have access to medical support, with some participants suggesting that the guidelines had a wider public health role outside of organised sports.

These issues can be linked to the absence of an explicit communication and dissemination strategy that many study participants commented on, and which might have considered tailoring the guidelines to different audiences, ensuring greater clarity as to who the guidelines were for and how stakeholders should engage in the dissemination process. For example, a perceived lack of a visible communication strategy had created some confusion among NGBs on expectations of actions to take, including when and how to disseminate the UK Guidelines to their grassroots. There was also some variation between NGBs on other aspects of implementation. These included whether and how the UK Guidelines aligned with any concussion guidance they may already have had in place; whether they had sufficient resources and capacity to support implementation; and questions around accountability.

A key concern related to funding that would have been needed to enable such a communication and dissemination strategy to be developed and implemented, but adequate funds had not been made available to support such a process. Therefore, there was a perception that much of any communication effort had been on the launch of the UK Guidelines, but less on a longer-term strategy to develop broader awareness campaigns.

Our observations should be considered in the context within which the UK Guidelines were developed and published. The guidelines drafting and communication groups were convened in March 2022, with the aim of developing, agreeing and communicating the guidelines during the same year. This was an ambitious schedule, requiring the drafting group to produce a high-quality, evidence-based set of guidelines and the communication group to effectively plan and deliver a dissemination strategy within a very tight timeframe, and as noted, with little or no funding to support these efforts. Furthermore, these activities took place against the background of what we described earlier as 'political turbulences' during 2022.[48] Although our interviews did not specifically explore the role of the wider context, it is conceivable that frequent changes in political leadership may have contributed to a lack of continuity in policy direction and support and diverted attention and capacity across sectors, a challenge that is commonly reported in the context of policy implementation, or lack thereof.

Furthermore, the year 2022 also saw major recovery efforts from the COVID-19 pandemic, which, among the sports, may have deprioritised concussion as a policy issue, in particular in sports where perceived risk of concussion was lower or attention focused on other pressing health and safety concerns.[64 65] This, in combination with limited funding, made it particularly challenging to ensure continued broad stakeholder engagement, long-term planning, and consistent implementation across the sport, education, and health sectors. A perception that the health sector may not be fully aware of the guidelines or participated in their implementation may not be surprising. Sport-related concussion only accounts for a very small proportion of the work of primary and emergency care, and it would thus take longer than expected to get the guidelines embedded in practice.

An important finding was that study participants thought that public knowledge of concussion was high or increasing, but knowledge of the UK Guidelines was low. This perception was confirmed by our survey of members of British Gymnastics. This showed that there was indeed a comparatively high level of knowledge about concussion among survey respondents, with over 90% correctly identifying a concussion as an injury to the brain. Yet, recognition of concussion guidelines was generally low, with less than one-third of survey respondents recognising any of the seven sets of concussion guidelines presented to them. The UK Guidelines were the most recognised concussion guidelines. Having said that, among those who recognised at least one concussion guideline, just over half reported having actually read them. Importantly, the proportion of respondents who felt confident in recognising and managing a concussion was higher among those who had read the guidelines compared to those who had only recognised a concussion-related guideline.

Just over 40% of survey respondents recognised the strapline 'If in doubt, sit them out' but their understanding of its meaning varied. Coaches and welfare officers demonstrated the highest level of correct interpretation, while gymnasts aged 11-15 showed the lowest. Young gymnasts also showed a low understanding of the appropriate actions to take following a suspected concussion, compared to just under two-thirds of parents/carers and gymnasts aged 16 years and over who correctly stated that gymnasts should stop training immediately following a suspected concussion. This was despite British Gymnastics having made available a child-friendly version of the guidelines, although awareness will be

shaped the degree to which they have been disseminated and implemented locally.

We found that coaches and welfare officers were consistently more knowledgeable about concussion symptoms and actions to take than gymnasts or gymnasts' parents. Of those who did recognise at least one set of guideline, coaches and welfare officers were most likely to do so. However, knowledge about appropriate timelines for returning to school, work, training, and competition following a concussion was limited across all groups, with fewer than one in five coaches and welfare officers as well as parents/carers and gymnasts aged 16 years and over correctly stating that gymnasts should not return to school or work immediately after becoming symptom-free. Most respondents showed limited understanding of the recommended timeframe for returning to activities with a risk of head injury after becoming symptom-free.

Finally, in our survey, twenty-one (7.3%) gymnasts reported ever having experienced a concussion. It is difficult to interpret this number against the background of the online survey methodology and the absence of comparable data from other sources. Data from the USA suggests that concussion is a less common injury among gymnasts compared to injuries of upper and lower limbs,[66 67] and epidemiological data on injury prevalence in gymnastics tends to focus on the latter. Community and school-based surveys of children and young (<18 years) rugby players in England report prevalence rates of self-reported concussion ranging from between 8-9% (following training and outside of rugby league) and 25% (during or following a match),[68] up to 47% among players at schools offering rugby union.[69]

Finally, as concussion is not a high priority for the NGB, findings might not be generalisable to individuals engaged in other sports. Among the sports we examined, those that saw concussion as a very high risk such as rugby and taekwondo had been more active in promoting messaging on concussion.

4.3 Conclusions

The systematic advancement of the UK Guidelines provides an important opportunity for Government, related agencies and NGBs to strategically support concussion awareness and management of sports participants. Our study suggests that while the UK Guidelines are widely welcomed and supported by the sports sector at national level, more needs to be done to ensure that messages filter through to those actively engaging in sports on the ground. Based on our analysis, we propose a set of options to be considered to ensure that the UK Guidelines are widely implemented and benefit all participating in sports.

Improve accessibility and readability through simplified, audience-specific, and clearly communicated language

There is a need to simplify the UK Guidelines, both in relation to the language used and the groups that the guidelines are aimed at. This should consider developing a child-friendly version, given that our survey showed that over one-third of gymnasts aged between 11-15 did not understand the strapline 'If in doubt, sit them out'. There also remains the question about the degree to which children should be able to recognise and manage concussion. Study participants made a range of suggestions that might enhance wider accessibility and greater readability. These included: tailoring versions for different audiences and shortening them, for example, creating a pocket guide or one-page poster or leaflet; and using other media to convey messages such as videos at sporting events or within popular TV programmes. There is an opportunity to take advantage of the resources already developed by some NGBs as described in Table 4 (Section 3.4.5) of this report.

Guideline revisions should also consider involving intended audiences to test guideline accessibility and increase engagement with and enhance ownership of the UK Guidelines. It was suggested that the revision could be led by

a small(er) drafting group and include a series of consensus building exercises with a wider range of stakeholders. Such an approach would also ensure that voices that are less frequently heard will be considered systematically. Other potential actions include conducting a series of focus group discussions with those that are meant to implement the guidelines, such as coaches and people participating in sports.

There is a need for consistent messaging to alleviate concerns including (but not limited to) that guidelines might not be taken seriously, and, in particular, the perceived complexity and lack of clarity about the return to activity (education/work) and sport section. There was also a lack of clarity about when to advise individuals to consult a health professional, particularly in the 28-day period following a concussion among stakeholders and survey respondents. There may be an opportunity for technical solutions to support and strengthen the return to education/work and sport advice including an app supporting different pathways.

Strengthen national leadership with a clear mandate and resources

The further development of the UK Guidelines could consider identifying a single body at national level overseeing the regular updating of the guidelines. In addition to ensuring that the guidelines remain evidence-based, this body could also be tasked with the development and oversight of a longer-term strategy for dissemination and communication. Any such strategy should include regular national and local publicity campaigns to enhance broad awareness among different target audiences. This should be accompanied by ongoing education programmes to address outdated information and reduce persistent misinformation related to concussion in sport.[70 71] However, for this to be effective it will be important that the body is equipped with appropriate funding and mandate to carry out these activities.

There may be an option to incorporate relevant content, especially the return to activity (education/work) and sport section, of the UK Guidelines into regular safety training in sports, such as first aid courses, which are delivered fairly frequently, and which were listed as the main sources of concussion training among survey respondents. It would further provide opportunity to systematically engage with the health sector to ensure that frontline health professionals, such as general practitioners, are familiar with the signs, symptoms and management of concussion.

This national body could also host a repository of 'best practice', including learning materials, videos, reporting mechanisms, along with free and more generic materials, for NGBs and others to add to and learn from. Such a repository may be especially useful for smaller NGBs who have limited capacity to develop their own policies and tools.

There may be opportunity to learn from the experience in Australia, where the Australian Institute of Sport (AIS), a division of the Australian Sports Commission, which is the Australian Government agency responsible for supporting and investing in sport at all levels, develops and hosts a wide range of resources on concussion in sport for different audiences.[72]

Clarify different stakeholders' roles and responsibilities

The effective implementation of the UK Guidelines depends not only on the quality of the guidance itself but also on clearly defined roles and responsibilities across all levels of the system. This ranges from the development of clear, accessible guidelines to their dissemination, to promoting cultural change that enables safe behaviours. For each of these steps it is essential to specify who is responsible for what task and at what level. This includes detailing the roles of national bodies, governing organisations, educational institutions, clubs, coaches, health professionals, and individuals participating in sport.

Although the UK Guidelines describe actions for coaches, teachers, volunteers; parents and carers; and players, the roles of other stakeholders, particularly those in the health sector, remain unclear. For instance, the responsibility for authorising an athlete's return to sport following a concussion remains ambiguous. It is unclear whether this decision should lie with health professionals, such as general practitioners, or with coaches, leading to confusion, and potentially undermining individuals' roles. Addressing such ambiguity could help support the delivery of consistent messages to patients and the public, reinforcing alignment across both clinical and community settings.

Future updates of the guidelines should consider developing and incorporating a framework detailing roles and responsibilities, specifying not only who is expected to act, but also what their responsibilities entail and how these should be carried out. This should also include clear communication of what is expected of NGBs in terms of guideline dissemination and implementation, and incorporate accountability mechanisms, including regular review of actions taken.

This could draw on the experiences in New Zealand, where Salmon and colleagues[73] proposed a 'framework of responsibilities' in the context of New Zealand Rugby, which systematically maps stakeholder roles across the sports system. A similar approach could be taken in the UK to improve clarity, enhance communication, and support consistent implementation of the guidelines, particularly at the grassroots level. A clearly articulated and coordinated approach will help ensure that all stakeholders, from policymakers to frontline practitioners to sports participants, are empowered to support consistent and effective concussion management across the sporting landscape.

Expand dissemination to reach and engage all groups involved in sports

The further development of the UK Guidelines should consider a systematic and strategic participation of the education sector and schools. Limiting guideline dissemination and implementation to the organised sports sector risks overlooking the large number of people who are active in sports but who are not organised in or linked to a NGB, such as those playing sports as a casual weekend activity.

Greater use could be made of the regular Active Lives Surveys[26] overseen by Sport England by adding related questions. This would not only serve to raise awareness among survey participants, who might act as multiplicators for further dissemination of key messages among people participating in unorganised sport or physical activity, it would also enable monitoring knowledge about recognising and managing concussion in the wider population.

Embed guideline dissemination in wider polices addressing behaviour in sport

Even when concussion guidelines are clearly written, widely delivered, and effectively disseminated, this does not necessarily translate into improved concussion management such as through increased reporting of concussion or adherence to return to education/work and sport guidance. Research consistently shows that better knowledge in itself does not automatically result in behaviour change.[74] A common reason that prompts athletes not to report a suspected concussion is a reluctance to let their team down or risk being excluded from training or competition.[68 69 75-77] This highlights a broader challenge in many sporting contexts, namely that there is not always a strong, supportive network in place that would enable favourable concussion-related behaviours. Instead, there may be emphasis on team commitment that may inadvertently discourage individuals from reporting symptoms or prioritising their own wellbeing.

Concussion is a pan-sport issue that requires a unified and consistent approach across NGBs and all sporting contexts. This is especially important for individuals who frequently participate in multiple sports, where a concussion sustained in one sport should inform their withdrawal from others during recovery. Yet even the clearest management guidance and return-to-activity protocols rely on honest self-reporting. If the prevailing culture discourages disclosure, athletes may choose not to report to continue playing elsewhere, undermining the effectiveness of a unified approach.

While concussion education remains essential, greater attention must be given to the underlying culture within sport. Creating environments that actively support and normalise reporting of concussion, while reducing the social and competitive pressures that discourage it, will be key to ensuring player safety and wellbeing. This requires a system-wide approach that takes account of the unique needs of each stakeholder and reconciles performance and team commitment with positive concussion-related behaviours.

Suggestions for further research

Further research should support a comprehensive approach to concussion management by strengthening the evidence base for prevention. The UK Guidelines currently emphasise the recognition and management of concussion in sport. Yet, as has been argued elsewhere, a comprehensive approach would not only consider mitigating the acute health impacts of sport-related concussion but also strive to reduce the incidence of concussion in sport.[78] Misconceptions about preventive measures remain prevalent, for example, individuals, players as well as coaches, incorrectly believing that wearing headgear can prevent concussion.[69 79] Research should prioritise the development and evaluation of practical, evidence-based prevention strategies. These may include promoting safer techniques or delivering targeted awareness campaigns that can be incorporated into the UK Guidelines to reduce the initial incidence of concussion.

Further work is needed to better understand why concussion awareness is not consistently prioritised in sports with a risk of concussion. Our findings suggests that resource constraints, particularly among smaller or less well-resourced NGBs, may limit the extent to which concussion is communicated, which can be exacerbated by competing priorities. Research that explores structural and financial barriers within NGBs will be important to ensure that appropriate support can be provided to those with limited capacity. A more equitable approach would ensure that all sports implement a concussion policy and guidance that is aligned with the UK Guidelines. This would be especially important for individuals who participate in multiple sports, as consistent messaging and practice are essential to ensure sport participant safety and wellbeing.

There is also a need for work exploring effective ways of engaging a wide range of stakeholders in the health and education sectors, as well as participants in informal or unorganised sports settings to ensure consistent approaches and, more importantly, buy-in.[78] General practitioners, school staff, physical education teachers, as well as parents and carers play a crucial role in the prevention, recognition and management of concussion, particularly among children and adolescents involved in grassroots sport. Embedding concussion education in schools and clubs, and more explicitly linking it to player welfare, may improve prevention, early identification, and safer return-to-activity decisions. In-depth work with schools or clubs could provide valuable insights into how concussion, and, by extension, the UK Guidelines are understood and implemented at the community level.

Finally, as noted, while improving knowledge about concussion through, for example, education programmes, is necessary, it will not be sufficient to create the behaviours needed to ensuring player safety and wellbeing.

Empirical evidence suggests a mismatch between what individuals know and how they act in practice.[68 80] To better understand these behaviours and the underlining factors that influence them, future research should take a broader multidisciplinary approach and bring in insights from disciplines such as behavioural science, sports culture, psychology and sociology, to help advance understanding of the social norms, team dynamics, and individual motivations that shape reporting and return-to-play decisions. There is a need for further in-depth qualitative work to explore the cultural and environmental factors that affect how concussion is recognised, reported, and managed in different settings.

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Appendix 1. Summary of main actions outlined by the Government in its response to the 2021 Select Committee Report on Concussion in Sport

1. Research

- DCMS in conjunction with the Medical Research Council (MRC) will convene a Sports Concussion Forum to identify research priorities.
- The Government is supporting the research project led by the Podium Institute quantifying the incidence and economic burden of sport-related concussion across the United Kingdom.

2. Education

- DCMS will commission a set of shared protocols around concussion in sport.
- DCMS will create a distribution network of key stakeholder to communicate protocols across the sports and education sector.
- The Minister for Sport will write to UK Sport and Sport England to explore what can be done to ensure protocols implemented by sports in receipt of public funds.

3. Health

- DCMS will look at ways to strengthen links across government, including more effective protocols and pathways for treating concussion in sport injuries in NHS A&E settings, focused on the specific needs of individuals and continually improve the safety of players.
- DCMS will contact sports to highlight need to prioritise the long-term welfare of player.
- DCMS will explore the possibility of working with the Premier League to pilot a scheme for clubs to embed player welfare.

4. Technology

- DCMS will convene a round table of tech companies to find solutions to mitigate effects and instances of concussion in sport.

Source: Minister for Sport Tourism Heritage and Civil Society. Government Response to DCMS Select Committee Report on Concussion in Sport. London: Her Majesty's Stationery Office, 2021.

Appendix 2. Methods of data collection and analysis

Appendix 2.1 Document review

A2.1.1 Evolution of the UK Guidelines

To understand the wider context within which the UK Guidelines were developed and implemented, we reviewed transcripts of parliamentary debates on concussion in sport taking place in the House of Commons and the House of Lords from 1962 to2024. Relevant debates were identified using the Hansard search form (https://hansard.parliament.uk), and the terms 'concussion' and 'sport'. This identified 74 debates. Transcripts of all the debates and discussions (all years) relating to the subject and were uploaded to NVivo 14 software for categorisation and analysis. Data were extracted on date and title of meetings and debates, where carried out, summary of key points, people involved and key influencing events. The data were used to inform a timeline of events.

A2.1.2 Concussion policies or guidelines published by six priority sports in England

Following established methods for reviewing websites,[30] we carried out a desk review of websites and publicly available documents of NGBs of the six priority sports in England. Documents were identified using the Google general search engine and broad search terms combining 'concussion' and '[organisation name]'. The review explored concussion policies of organisations, with a focus on whether and how the UK concussion guidelines have been referred to (if at all). We extracted data from websites into a standardised data extraction form that allowed us to compare and contrast across the different organisations.

We collected information on:

- Whether there was a published policy and/or guidance on concussion and key characteristics (e.g., date published, aim, scope, target group/s)
- Whether, and how, UK concussion guidelines were referred to or presented (e.g. direct mention or referenced within the organisation's other materials)
- Prominence of guidelines and how easy they were to find (intuitiveness, recording time to find, number of clicks etc.)
- Format presented (e.g. hyperlink, downloadable document, video etc.)
- Functionality (e.g. are hyperlinks working etc.)
- What other materials related to concussion were available and when they were last updated.

A2.1.3 Analysis of documents

Findings from the review were synthesised narratively and reported in summary tables.

Appendix 2.2 Survey of members of British Gymnastics

A2.2.1 Review of existing survey instruments

To inform the design of the survey, we conducted a review of existing concussion-related measurement tools. Existing tools to assess knowledge and attitudes towards concussion include the Rosenbaum Concussion Knowledge and Attitudes Survey (RoCKAS),[81] which was developed to test the awareness and knowledge of concussion on the general population. The Concussion in Youth Sports Questionnaire developed by the Centers for Disease Control and Prevention in the United States has been widely used to assess athletes' and coaches' awareness and understanding of concussion.[82] A further widely used tool to test the knowledge of concussion among child aged 5 to 12 years is the Child-SCAT5.[40] However, to our knowledge, there is no standard instrument specifically designed to evaluate awareness and attitudes to concussion guidelines.

We searched the biomedical and life sciences literature database PubMed from inception to date to identify surveys focused on concussion awareness, knowledge, and guidelines. The search was restricted to titles and abstracts, using a combination of the following search terms: 'concussion' AND ('awareness' OR 'knowledge') AND ('guidelines' OR 'policy' OR 'protocol') AND ('survey' OR 'questionnaire'). This broad approach sought to ensure identification of a range of survey studies relevant to the objectives of this evaluation. We only included studies that also provided a survey instrument; studies that did not allow for access to the survey used in the full text or supplements were excluded. Following title and abstract screening of 115 records, 55 papers were included, with 60 excluded primarily because they used research methods other than survey design, such as reviews, interviews, and other forms of studies. After full-text screening, a total of 34 studies were included in the final analysis.

We extracted survey questions from included papers, with duplicate questions removed and compiled these into a 'question database'. We used this database to develop the British Gymnastics survey, tailoring questions to the gymnastics context and different stakeholder groups (gymnasts, parents/carers, coaches and welfare officers).

Appendix 3. Overview of debates in the House of Commons and House of Lords relating to concussion in sport, 1962-2024

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
1962	Lords	Boxing Bill (first reading in Lords) debate	Lord Taylor	Debates effects of concussion in boxing and difficulties in diagnosis. Notes: *"Every young doctor is taught, as I was as a student, to treat concussion extremely seriously, and we assess the effect of concussion very simply, not merely by loss of consciousness, but also by loss of memory"* (Lord Taylor). Lord Brain called for the setting up of a Lords/Royal College of Physicians Select Committee to hear expert evidence on the subject.	
1970	Lords	Professional Boxing and Injury Risk – Lords Debate	Lord Aberdare	Debate on how risk of chronic concussion is managed by the British Boxing Board of Control. Considered amateur boxing not so dangerous (run by the Amateur Boxing Association), referring to loss of consciousness as concussion. Some members of the Lords calling for a ban on boxing due to its risk of serious injury. Lord Aberdare was medical advisor to Board of Boxing and considered himself independent.	
1991	Lords	Boxing Bill 1st Reading	Lord Taylor	Reintroduction of the Bill to abolish boxing, which did not make a second reading in the Lords 10 years earlier when it was defeated. More evidence that boxing leads to brain damage. British Medical Association had called for its abolition in 1987. Seventeen members voted for and 20 members against the Bill.	
1995	Lords	Boxing Bill 2nd Reading	Lord Taylor	Reintroduction of the Bill due to serious injuries (death of 23-year-old Bradley Stone in 1994 following boxing injury; fight between Nigel Benn and Gerald McClellan, with the latter quoted as saying "I get a buzz from knocking people unconscious"); amendment to Bill voted on and agreed.	2003 US Centers of Disease Control & Prevention launch 'Heads Up' campaign (set of education materials to help healthcare providers diagnose and manage concussion.

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2013					
	Commons	Business of the House	Chris Bryant MP	Raises a question in the House in reference to Hugh Lloris concussed on pitch and being forced to go back on and play. Calls for urgent debate on concussion in sport. Notes evidence that people forced to play again after being concussed may be linked to subsequent premature dementia.	
2014					
27/02	Lords	Concussion Question for Short Debate	Lord Addington	Poses question to Government on advice given to (1) sports national governing bodies, and (2) national medical services regarding concussion sustained in sporting injuries. Focus on non-elite aspect of sport (amateur or community-level). Cites work by Dr Willie Stewart of a survey of schools in Scotland about awareness of concussion in sport. Cites report in the New York Times of a 29-year-old former football player who had died from chronic traumatic encephalopathy.	American biographical sports drama film 'Concussion' released 2015, based on the GQ exposé 'Game Brain' by Jeanne Marie Laskas.
13/03	Commons	Business of the House	Chris Bryant MP	Calls for setting up of a Parliamentary Inquiry into concussion in sport, arguing that the sports governing bodies were in "complete denial about the danger that is posed to many of their players" and asks for an inquiry because "the danger is too serious".	
15/07	Commons	Topical Questions	Chris Bryant MP	Asks for concussion in sport to be taken seriously citing increasing evidence of chronic traumatic encephalopathy identified as a "major cause of depression, dementia and in many cases suicide"; queries whether the Minister would bring all sporting bodies, doctors and teachers together, with other ministerial colleagues to take concussion seriously.	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
22/07	Commons	Summer Adjournment	Chris Bryant MP	Raises again concerns about concussion in sport, referring to United States legal action against the National Football League, which had led to a $1 billion class suit; the death of former English football player Jeff Astle in 2002, which had been attributed to repeated minor traumas to his head caused by heading the ball; incidents at the 2014 World Cup with players returning to play after sustaining concussion; and the double-impact syndrome leading to the death of 14-year old schoolboy Ben Robinson in Northern Ireland in 2011. Queries lack of action by the Football Association (FA) in England in terms of commitment to research to investigate further the circumstances of the death of Jeff Astle. Mentions joint report by John Glen MP, Chris Heaton Harris MP, Lord Addington and Baroness Tanni Grey-Thompson calling for a parliamentary inquiry into concussion to increase awareness of seriousness of this condition.	
04/12	Lords	Sport Governance (Debate)	Lady Grey-Thompson	Raises need for better governance of sport's governing bodies in relation to protecting their members from concussion among other things and the need for education and sport to work together.	
2015					
					Sport Scotland publishes 'If In Doubt, Sit Them Out. Scottish Sports Concussion Guidance: grassroots sport and general public' for the first time in 2015.[13]

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2016					
04/02	Commons	Preventing Violence Against Women: Role of Men (Debate)	Chris Bryant MP	Uses Debate to highlight wider issues around the male shape and behaviours in sport, linking this is attitudes to sustaining a concussion in sport (rugby) and how these need to change. Used phrase 'if ever in doubt, sit it out'.	Consensus statement on concussion in sport – the 5th international conference on concussion in sport held in Berlin, October 2016.[83]
03/03	Commons	Business of the House	Chris Bryant MP	Repeats call for parliamentary inquiry into concussion in sport, citing Open Letter by doctors and academics (Sport Collision Injury Collective) calling for a ban on tackling in rugby matches played in UK and Irish schools and referring back to the death in 2002 of former footballer Jeff Astle; the death in 2011 of 14-year old Ben Robinson due to second impact syndrome [see also above contribution 22 July 2014 to House of Commons debate] and the 2015 film 'Concussion'.	
2017					
30/11	Commons	Work, Health and Disability	Chris Bryant MP	Announces to chair the newly set-up All-Party Parliamentary Group on Acquired Brain Injury (APPG ABI) (including those resulting from concussion in sport) which may lead to chronic traumatic encephalopathy.	
2018					
03/05	Commons	Business of the House	Chris Bryant MP	Proposes an acquired brain injury Bill to "guarantee that anybody who has a traumatic brain injury and receives hospital treatment then gets a rehabilitation prescription, so that they can be brought back to as full a life as possible"; invites Leader of the House to attend meeting of the APPG ABI on concussion.	2015 Scottish Sports Concussion Guidance updated. All-Party Parliamentary Group on ABI Report 'Acquired Brain Injury and Neurorehabilitation. Time for Change' published; includes chapter on sport-related concussion.
18/06	Commons	Acquired Brain Injury Debate	Paula Sherriff MP	ABI debated by members and House noted it has considered Acquired Brain Injury (ABI).	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2019					
04/02	Commons	Sport in the UK Debate	Chris Bryant MP	Cites several cases of athletes who had died after sustaining head injuries including in the UK (Jeff Astle; Ben Robinson) and elsewhere (Canada, France). Highlights lack of understanding of understanding of chronic traumatic encephalopathy and sequelae, misunderstanding of what constitutes concussion and misguided attitudes towards concussion among players, spectators and the wider sports communities.	
12/02	Commons	Mental Capacity (Amendment) Bill [Lords]	Chris Bryant MP	Raises concern about misunderstanding of what concussion involves, particularly in sport, and the consequences of that. Bill went to third reading.	
09/05	Commons	Acquired Brain Injury	Chris Bryant MP	Asks for the House to note the [2018] All Party Parliamentary Group on ABI and support its conclusions; highlights the need for protocols to manage concussion in sports; for return to school plans for every child with ABI; training for teachers, prison officers and benefits assessors; and for sport, government and professional clinical bodies to work collaboratively to improve health professionals knowledge of concussion management.	
2020					
06/02	Commons	Acquired Brain Injury	Chris Bryant MP	Asks for the House to consider matter of ABI to debate. Refers to increasing evidence linking sports and ABI. Highlights lack of action by UK government, citing legislation in USA about sports' duty of care to participating individuals. Calls for Department for Digital, Culture, Media and Sport to bring all sports bodies together to analyse this problem; concerned that lack of action may result in "massive court cases and very big fines, as has happened in the United States of America".	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2021					
11/02	Commons	Business of the House	Chris Bryant MP	Notes House of Commons Digital Culture Media and Sport Committee work on concussion in sport; calls for debate in House of Commons.	House of Commons Digital Culture Media and Sport Committee publishes Report on Concussion in Sport (July 2021).[12] Publication of Government response to Select Committee Report on Concussion (December 2021).[14]
11/03	Commons	Concussion in sport (Debate)	Chris Bryant MP	Notes that the Digital, Culture, Media and Sport Committee inquiry had started work into concussion in sport; highlights need for a shared set of protocols "with the same language used in all sports, and that will only happen if it comes from the Government"; notes that all states in the USA had introduced legislation on concussion in sport between 2009 and 2015, and the US traumatic brain injury Act and potential need for legislation if sporting bodies "are not prepared to act".	
22/04	Commons	British Wrestling (Debate)	Mark Fletcher	Advises promotors of wrestling to read and follow recommendations on health and safety (concussion) protocols in the APPG ABI report. Wrestling is lacking such guidance	
11/05	Commons	Debates on the Address (1st day)	Chris Bryant MP	Asks question on acquired brain injury and concussion, which was noted.	
12/05	Commons	Debates on the Address (Levelling up)	Chris Bryant MP	Asks same question about concussion in sport (related to levelling up chances in life and risk of dementia).	
12/05	Commons	Covid Update	Chris Bryant MP	Asks question about whether the Prime Minister (PM) would meet to discuss ABI – concussion in sport. PM said that he would try to meet.	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2021					
19/05	Commons	A Plan for the NHS and Social Care	Chris Bryant MP	Calls for a brain injury committee to support protocols in sport and get public bodies working together; minister said he would meet him to discuss further.	
27/05	Commons	Dementia Action Week	Alex Davies-Jones	Raises concerns about rise in dementia for athletes. References inquiry into concussion in sport and work by Willie Stewart linking women and girls to having double the risk of concussion from playing sport.	
13/07	Commons	Randolf Turpin	Caroline Dineage	Debate to highlight Randolph Turpin's achievement as middleweight boxing champion 70 years ago. Example of long-term impact of concussion and head injury. Noted that Minister for Sport at the time was working with NGBs to put in place protection measures and deciding what role government can do to convene research and improve education on concussion.	
20/10	Commons	Business of the House	Chris Bryant MP	Announces round table discussion on concussion in sport and the effect on football and rugby players; asks for a debate on government plans and the development of protocols to protect people. Government commits to raise this with the Department of Health and Social Care and the Department for Education.	
2022					
27/10	Commons	Exempt Accommodation	Chris Bryant MP	Links issue of housing to vulnerable people, noting that many of the most vulnerable people who are housed in exempt accommodation are people with acquired brain injuries, which may have resulted from concussion in sport, among other causes; calls for the select committee which examines the issue of housing to provide input into the national ABI strategy.	Guidelines Forum (initially known as 'Concussion in Sport Foundation Protocol Forum') convened in March 2022.[29]

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2023					
15/03	Lords	Rugby 200th Anniversary	Lord Parkinson	States that he is working with interested parties across sporting world to develop a single set of shared guidelines for concussion to be shared in due course.	UK Concussion Guidelines for Non-Elite (Grassroots) Sports published in April 2023.[15]
02/05	Commons	UK Concussion guidelines for Grassroots Sport (Debate)	Sir Chris Bryant MP	Poses urgent question to Secretary of State for Culture, Media and Sport to make a statement on UK concussion guidelines for grassroots sport; welcomes the UK Guidelines but is concerned about focus on management rather than primary prevention; lack of medical approval before return to sport; the role of the guidelines for elite sport; how to get schools to understand concussion and brain injury better; and whether term concussion should be replaced with 'brain injury'; further debate.	
03/05	Lords	UK Concussion guidelines for Grassroots Sport	Lord Bassam	Welcomes the guidance. NGBs would need to keep own protocols under review and players should be mindful of being role models to others (e.g. take medical advice). Lord Parkinson said that NGBs were working on prevention. England and Scotland FAs have banned heading ball in primary school age children; working with NGBs to ensure guidance disseminated to everyone who needs it. Lord Addington asks about protection of those playing multiple sports, including the coordination of recovery from concussion in one sport across multiple sports. Lord Parkinson answered that there is cross-governmental (education and health) engagement and guidelines will be disseminated through all channels to make aware but NGBs should make sure this baseline guidance is tailored to the context and setting of each sport. They should give any additional messages, but guidance is first step.	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2023					
07/06	Commons	Professional Wrestling: Event Licencing and guidance	Charlotte Nichols	Debates licencing wrestling (events and practice). Recommends wrestling follow UK concussion guidelines, and some further discussion to be had around whether wrestling should be considered a sport or entertainment.	
14/09	Commons	Football and dementia	Stuart Andrew	Discusses importance to give guidelines to grassroots sport who do not have medical advisors on hand. Research group on concussion in sport and a concussion in sport innovation and technology advisory panel to help with concussion in sport issues ongoing basis. DHSC is formulating a new strategy on acquired brain injury, including dementia and DCMS is ensuring sport is adequately represented. New care fund set up by FA and Premiere League for former players affected by dementia. FA has also a dedicated brain health team to support former players and families. Looking at whether dementia can be treated as occupational disease (ongoing). Question "this house asks the government to investigate the links between football and sport-related neurodegenerative disease" to go forward.	
23/10	Lords	Domestic violence and brain injury	Baroness Manzoor	Adds to debate the evidence that young girls in sport have a higher rate of concussion and consequences and argues for preventative elements to ensure young girls are safe in sport by working with DCMS.	
13/11	Lords	Building an NHS fit for the future	Dame Caroline Dinenage	Notes guidance from the government on preventing and addressing concussion in grassroots sport. Work in this area, alongside the all-party parliamentary group on acquired brain injury, has shown that signs and risks of concussion, including possible links to dementia are not yet understood well enough.	

Date	House	Title and type of meeting	Speaker referring to concussion	Notes	Key events/dates
2024					
18/04	Commons	Footballers: risk of dementia	Stuart Andrew	Notes that government leading on work on concussion. Worked with stakeholders to develop guidance on concussion for grassroots, which had aided professional sports. Evaluation ongoing and will help improved sport-related education and health. Also convened sports concussion research group to identify questions that still need answering and an innovation and technology panel to look at practical ways to aid safety and mitigate concussion.	Concussion in Sport Research Forum publishes report on 'Priorities for research to better understand the risks, consequences, prevention and treatment of injuries relating to head impacts in collision sports'.[16]
24/04	Commons	Brain injuries in football	Stuart Andrew	Mentions the UK Guidelines that were developed by panel of UK and international experts in field of sport-related concussion, building on the Scottish guidelines. Notes that devolved nations expand remit of new guidelines to cover the whole UK and full use of all people in sport (participants, coaches, volunteers, parents, those working in education and healthcare). Research forum to look at concussion in sport brings together key academic experts with experience in traumatic brain injury, neurology and concussion to identify the priority questions around sports concussion that still need to be addressed. Report to identify the priority areas to be completed in 2024. Advisory panel with aim of identifying technological innovations that can help with concussion in sport. DHSC formulating the government's new ABI strategy, including dementia to make sure sports involved in this gathering of evidence.	

Appendix 4. Survey of members of British Gymnastics: descriptive summary statistics

Table A.1. Age, gender and ethnicity of survey respondents by respondent group

Variable	Category	Coach and Welfare Officer N = 44	Gymnast aged 11-15 N = 37	Parent N = 188	Gymnast aged 16 and over N = 20
Age group	11-15	1 (2.3%)	37 (100%)	0 (0%)	0 (0%)
	16-24	6 (13.6%)	0 (0%)	0 (0%)	17 (85%)
	25-34	12 (27.3%)	0 (0%)	33 (15.9%)	0 (0%)
	35-44	11 (25%)	0 (0%)	116 (61.7%)	1 (5%)
	45-54	7 (15.9%)	0 (0%)	34 (18.1%)	2 (10%)
	55-64	7 (15.9%)	0 (0%)	4 (1.9%)	0 (0%)
	65 and over	0 (0%)	0 (0%)	1 (0.5%)	0 (0%)
Gender	Female	34 (77.3%)	32 (86.5%)	170 (90.4%)	17 (85%)
	Male	9 (20.5%)	5 (13.5%)	15 (8%)	3 (15%)
	Prefer not to say	1 (2.3%)	0 (0%)	3 (1.6%)	0 (0%)
Ethnicity	Asian/Asian British	1 (2.3%)	0 (0%)	7 (3.7%)	1 (5%)
	Black/Black British	0 (0%)	1 (2.7%)	4 (1.9%)	0 (0%)
	Mixed or Multiple	2 (4.5%)	2 (5.4%)	6 (3.2%)	2 (10%)
	Other ethnic group	1 (2.3%)	0 (0%)	3 (1.4%)	0 (0%)
	Prefer not to say	3 (6.8%)	1 (2.7%)	8 (4.3%)	1 (5%)
	White	37 (84.1%)	33 (89.2%)	160 (85.1%)	16 (80%)

Table A.2. Work experience and qualification of coaches and welfare officers (n=44)

Variable	Category	Count (%)
Work experience	Less than 1 year	5 (11.4%)
	1 to 2 years	4 (9.1%)
	3 to 4 years	4 (9.1%)
	5 to 9 years	8 (18.2%)
	10 years and over	23 (52.3%)
Qualifications (coach only)*	Gymnastics helper	6 (17.6%)
	Gymnastics activity instructor	1 (2.9%)
	UKCC level 1	5 (14.7%)
	UKCC level 2	8 (23.5%)
	UKCC level 3	7 (20.6%)
	UKCC level 4	3 (8.8%)
	UKCC level 5	4 (11.8%)
	Senior club coach	2 (5.9%)
	British Gymnastics tutor & Assessor	1 (2.9%)
Competition level of gymnasts they coach (coach only)*	No competition	4 (11.8%)
	School, club or regional level	20 (58.8%)
	National and international level	12 (35.5%)
	Not sure/Don't know	2 (5.9%)
Paid or volunteer role	Full-time	11(25.0%)
	Part-time	33 (75.0%)
Full-time or part-time	Paid	27 (61.4%)
	Volunteer	17 (38.6%)
Age group they coach (coach only)*	Under 5	18 (52.9%)
	5 to 8	32 (94.1%)
	9 to 13	32 (94.1%)
	14 to 17	28 (82.4%)
	18 and over	14 (41.2%)
Gender they work with (coach only)*	Males	3 (8.8%)
	Females	3 (8.8%)
	Both	28 (82.4%)

Note: * questions allow multiple selection of answer categories.

Table A.3. Gymnastics experience of the gymnasts under 11 years of age (parent/carer survey, n=188)

Variable	Category	Count (%)
Age of the gymnast	Under 5	29 (15.4%)
	5-7	76 (40.4%)
	8-10	83 (44.1%)
Gymnastics experience	Less than 1 year	71 (37.8%)
	1 to 2 years	61 (32.4%)
	3 to 4 years	35 (18.6%)
	5 to 9 years	21 (11.2%)
	10 years and over	0 (0%)
Competition level of gymnasts*	No competition	102 (54.3%)
	School, club or regional level	64 (34%)
	National and international level	9 (4.8%)
	Not sure/Don't know	17 (9%)
Frequency of doing gymnastics	Once a week	137 (72.9%)
	Several times a week	49 (26.1%)
	Everyday	2 (1.1%)
Other regular sports*	Swimming	68 (36.2%)
	Football	28 (14.9%)
	Dance	20 (10.6%)
	Cycling	15 (8%)
	Tennis	10 (5.3%)
	Netball	10 (5.3%)
	Martial Arts (e.g., karate, judo, kickboxing, taekwondo)	10 (5.3%)
	Cricket	7 (3.7%)
	Basketball	4 (2.1%)
	Others ***(All other sports combined)***	32 (17%)
	Do not do other sports	65 (34.6%)

Note: * questions allow multiple selection of answer categories.

Table A.4. Gymnastics experience of the gymnasts aged 16 years and over (n=20)

Variable	Category	Count (%)
Gymnastics experience	Less than 1 year	1 (5%)
	1 to 2 years	0 (0%)
	3 to 4 years	3 (15%)
	5 to 9 years	6 (30%)
	10 years and over	10 (50%)
Competition level of gymnasts*	No competition	7 (35%)
	School, club or regional level	8 (40%)
	National and international level	9 (45%)
	Not sure/Don't know	0 (0%)
Frequency of doing gymnastics	Once a week	3 (15%)
	Several times a week	17 (85%)
	Everyday	0 (0%)
Other regular sports*	Football	2 (10%)
	Swimming	1 (5%)
	Dance	1 (5%)
	Tennis	1 (5%)
	Basketball	1 (5%)
	Others ***(All other sports combined)***	6 (30%)
	Do not do other sports	12 (60%)

Note: * questions allow multiple selection of answer categories.

Table A.5. Gymnastics experience of the gymnast aged 11-15 years (n= 37)

Variable	Category	Count (%)
Gymnastics experience	Less than 1 year	3 (8.1%)
	1 to 2 years	1 (2.7%)
	3 to 4 years	5 (13.5%)
	5 to 9 years	21 (56.8%)
	10 years and over	7 (18.9%)
Competition level of gymnasts*	No competition	5 (13.5%)
	School, club or regional level	20 (54.1%)
	National and international level	14 (37.8%)
	Not sure/Don't know	1 (2.7%)
Frequency of doing gymnastics	Once a week	9 (24.3%)
	Several times a week	28 (75.7%)
	Everyday	0 (0%)
Other regular sports*	Swimming	4 (10.8%)
	Football	4 (10.8%)
	Basketball	4 (10.8%)
	Others ***(All other sports combined)***	30 (81.1%)
	Do not do other sports	13 (35.1%)
Filled the survey with parent/ carer	Yes	36 (97.3%)
	No	1 (2.7%)

Note: * questions allow multiple selection of answer categories.

NIHR | Policy Research Unit
Policy innovation and evaluation

The NIHR Policy Research Unit in Policy Innovation and Evaluation (PIRU) aims to improve UK health and social care policymaking by evaluating new policies in their early stages, or before they are implemented.

We are an independent team of researchers who are experts in evaluation and who advise the UK Government and its agencies on new policies in health improvement, health care and social care and their possible effects on different communities. We want to understand how well these policies are likely to work in practice and how they might reduce (or increase) inequalities. We also review what is already known about the effects of new policies.

Our partners

PIRU brings together independent public health, social care and policy evaluation experts from London School of Hygiene & Tropical Medicine (LSHTM), London School of Economics and Political Science (LSE) and University of Glasgow (Glasgow).

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