



# Professional Football Heading in Training Guidance

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# Heading in Training Guidance

## Executive Summary

In December 2020 the Professional Football Negotiating and Consultative Committee (PFNCC) Health and Safety Sub-Committee was tasked with developing evidence based 'Heading in Training Guidance' for the professional game.

A Heading Working Group of medical and policy representatives from The FA, Premier League, EFL, FA Women's Super League, League Managers' Association and Professional Footballers' Association commissioned four preliminary studies.

Based on this research initial guidance has been developed for season 2021/22. This guidance will be reviewed as further research increases understanding. Key elements of the guidance are:

- Heading recovery is factored into the structured post-match recovery that professional teams observe
- A recommended maximum of 10 higher force headers per training week, namely:
  - Headers following a long pass (those in excess of 35m), for example, returning a goal kick
  - Headers from crosses, corners and free kicks
- During the training week, clubs are encouraged to prepare players for the match demands of heading and moderate practices where possible to reduce forces



Professional  
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# Study 1. The Quantification of Heading

## University of Central Lancashire (UCLan)

UCLan carried out a systematic review of existing evidence related to the measurement of acceleration, force, nature and frequency of heading in adult football players during training and match-play.

The study considered moderating variables including technical categorisation, ball properties, playing position, level and gender.

The review found:

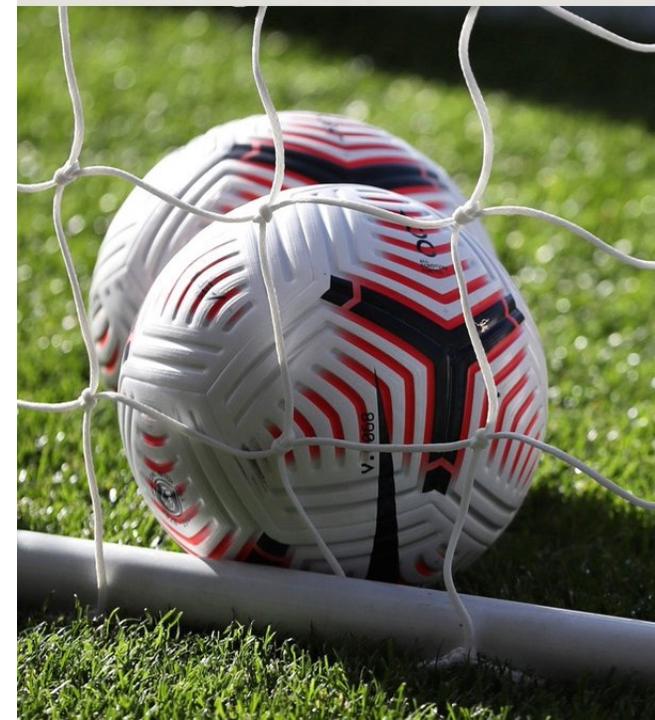
- Lack of studies measuring force transmission from competitive matches in elite level football
- Possible influence of neck musculature on force transmission during heading
- A proportion of studies reported lower acceleration values for males than females
- The effect of ball inflation pressure and the mechanical properties of the ball is unclear and requires further research



## Study 2. Heading in Matches Data - Opta

Average number of headers per match by position and competition

	Premier League (2013/14 - 2020/21)	EFL Champ. (2013/14 - 2020/21)	EFL League One (2019/20 - 2020/21)	EFL League Two (2019/20 - 2020/21)	Premier League U23s (2016/17 - 2020/21)	Premier League U18s (2019/20 - 2020/21)	WSL (2013/14 - 2020/21)
Defenders	7.02	9.28	9.08	10.10	5.3	4.16	5.74
Strikers	3.65	4.35	4.39	5.13	2.56	2.50	4.20
Midfielders	4.93	6.17	6.06	6.04	2.90	2.73	3.22



# Study 3. Heading Ball Analysis - Matches

## Second Spectrum

Second Spectrum collected the coordinates of the ball and player for every Premier League match from 2019/20 Season with the purpose to:

- Evaluate headers tagged by Opta using ball tracking to measure ball forces
- Categorise headers with force thresholds based on preceding event
- Analyse all games from season 2019-20

Second Spectrum analysis of Premier League matches found:

- Central defenders had the highest average force per match (7,928 N) followed by full-backs (4,290 N), forwards (3,657 N) and midfielders (3,172 N)
- Headers from corners, crosses, goal kicks and free kicks resulted in higher heading forces than those from passes and throw-ins



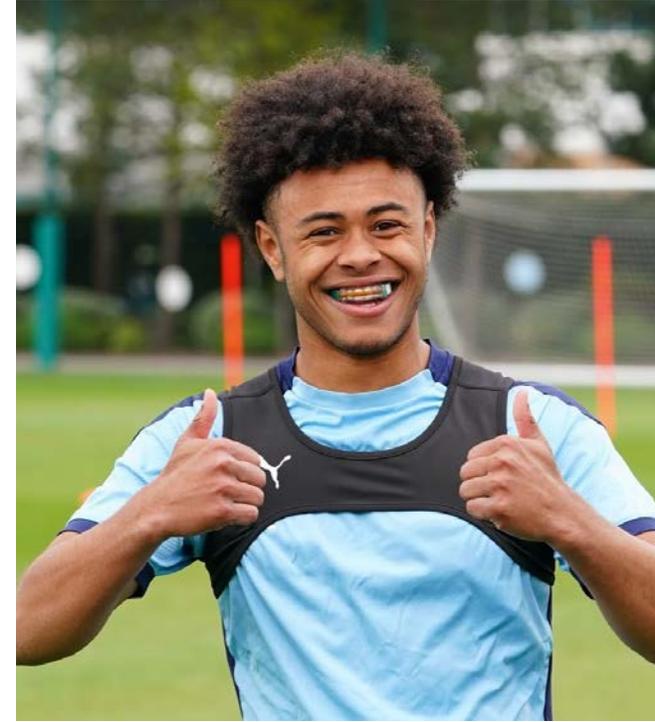
## Study 4. Heading Ball Analysis - Training

### Protecht

Protecht transmits real time data on head impacts and identifies the forces that a player has received using accelerometers molded into mouthguards. Testing was carried out at Liverpool FC and Manchester City FC involving players from the U18, U23 & Women's squads (45 mouthguards)

Data from this preliminary study found:

- Mean acceleration of the headers measured was 16.8 g (linear) and 1,373 rad/s<sup>2</sup> (rotational). Daily activity (running, walking and jumping) values are outlined in the literature to occur below 10 g (Ng et al, 2006). Linear and rotational mean values of 26.6 g and 2,000 rad/s<sup>2</sup> have been observed in other sports
- Headers completed following a long ball (over 35m) and cross resulted in the highest loads on a player's head, of a similar magnitude to the average values reported for sports such as rugby union and boxing
- Headers occurring when a player had taken more than three steps or had dived resulted in higher acceleration than when taking fewer than three steps, standing, jumping or moving backwards.
- The highest linear acceleration forces from heading were produced by the U18 male age groups



# Heading in Training Guidance

## Recommendations 2021/22:



Clubs should develop player profiles that consider the following:

- Gender
- Age
- Playing position
- The number of headers per match
- The nature of these headers

During the training week, clubs are encouraged to prepare players for the match demands of heading



It is advised that a heading recovery element is factored into the structured post-match recovery that professional teams observe following matches.



Training should mitigate the quantity and nature of heading practice during the training week. The following may be considered:

- Wherever possible limit the number of headers carried out when a player takes more than three steps and runs onto a ball or dives for a ball.
- Practice technique using thrown passes as this leads to lower peak accelerations.

Guidance will be developed to support clubs to adapt training to reduce forces involved whilst enabling key match actions to be practiced.

# Heading in Training Guidance

## Recommendations 2021/22:

A recommended maximum of 10 higher force headers per training week has been calculated. This recommendation applies to headers categorised as resulting in the highest forces, namely:

- Headers following a long pass (those in excess of 35m), for example, returning a goal kick.
- Headers from crosses, corners and free kicks.



The recommended limit has been calculated using the maximum mean number of headers occurring for any position group across professional football competitions, and therefore follows the principle of preparing players adequately for match-play. This is an initial recommendation designed to protect player welfare and will be reviewed regularly.

Whilst this guidance is focused on higher force header coaching staff and players should consider whether lower force headers are required in training to suitably prepare a player for match play.



Early but limited research suggests that there may be a relationship between neck strength and head acceleration, and this will be investigated further during season 2021/22. A strength and conditioning expert panel has been convened in order to produce a heading strength guidance document for professional clubs to be published no later than 1 September 2021.

# Heading in Training Guidance

## Monitoring

This guidance is provided for education and to assist clubs and players. At present there will be no regulation on implementing the guidance which is provided to safeguard player welfare.

During training sessions it is essential that club staff monitor each player's heading practice in real time, ensuring that the quantity of headers resulting in higher accelerations is minimised and is commensurate with each player's individualised match play heading profile.

Players are encouraged to familiarise themselves with these guidelines and limit any heading practice taking place outside of club organised sessions.

## Further Research

This guidance has been developed using a precautionary approach to protect player welfare even where scientific evidence is limited. Further research will be carried out in season 2021/22 which will inform revisions of the professional football heading in training guidance to be made in June 2022.

