

1 Abstract.

2 The Knowledge and Attitudes of UCI Competitive 3 Cyclists towards Sports Related Concussion.

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8 Abstract

9 1. Introduction

10 Sports related concussion (SRC) is categorised as a mild traumatic brain injury (McCrorry et al.
11 2017). Despite the general increase in knowledge of SRC risks, many athletes remain unaware that
12 the injuries sustained may be symptomatic of SRC (Hurst et al. 2019). The body of literature
13 informing the level of knowledge and attitudes of athletes towards SRC is mainly focused on field-
14 based sports due to their physical nature (Sullivan et al. 2016; Williams et al. 2018). However, in
15 the scarce epidemiological data of injury incidences within cycling, it is evident that SRC is not
16 only inherent in contact sports (Rooney et al. 2020).

17 There have been several noteworthy examples of SRC and unsafe attitudes within the professional
18 peloton. Most notably in 2020, when Roman Bardet crashed during stage 13 of the Tour de France
19 with 87Km remaining. Bardet subsequently completed the stage when he was later diagnosed
20 with SRC and removed him from the race. The death of professional cyclist and Olympic silver
21 medalist Kelly Catlin in 2019 is an example of the longer-term risks associated with the condition
22 (Lutz 2019). This riders' suicide was attributed to mismanaged post-concussion syndrome which
23 anecdotally highlights the importance of SRC knowledge in recognition and safe, short- and long-
24 term management of the condition.

25 The Union Cycliste Internationale (UCI) have recently published a consensus statement for the
26 diagnosis and management for SRC in cycling after many calls for action (Swart et al. 2021; Elliot
27 et al. 2019). It may be argued that competitive athletes are more at risk of SRC and portray a
28 willingness to take risk due to the fast, results driven nature of the sport. The aim of this study was
29 to explore and quantify competitive cyclists' level of knowledge and safety of attitudes around
30 SRC using an amended version of Rosenbaum's Concussion Knowledge and Attitudes Survey
31 (RoCKAS).
32

33 2. Materials and Methods

34 The study was a cross sectional study which aimed to recruit competitive cyclists. Competitive
35 cyclists were defined and identified as "*those who held an UCI racing license affiliated to their
36 respective national governing body, partook in at least club level racing league and were over 16
37 years old*". An amended version of the RoCKAS was used as a validated means of quantifying the
38 cyclists' knowledge and attitudes towards SRC (Rosenbaum and Arnett 2010). Due to the survey

39 originating from field-based sports minor amendments were made to the scenario-based sections
40 making them applicable to cycling which improved the face/content validity.

41 3. Results

42 A total of 155 competitive cyclists completed the online survey. The mean Concussion Knowledge
43 (CK) score was 24.4 (SD=3; range 0-36) which was a mean overall percentage score of 67.9%
44 (SD=9.5). The mean score for Concussion Attitudes (CA) was 49.05 (SD=4; range 19-59) which was
45 a mean overall percentage of 83.15% (SD=7). Two separate regression models were carried out
46 to examine the influence of age, history of SRC education, SRC diagnosis and overall CK levels on
47 CA and CK scores. Through individual section analysis there was a notable disparity between
48 athletes' attitudes and actions. The study found a previous history of official SRC diagnosis and
49 SRC education, had a significant positive association with overall CK scores. Conversely, age
50 category had a significant negative association with CK. With CA levels, only age group was found
51 to have significant positive associated with CA, with older aged categories having safer attitudes.

52 4. Conclusion

53 Competitive cyclists have a comparable level of CK and CA to other sports, however, there remains
54 a notable disparity between CK, and CA. Competitive athletes were aware of the risks associated
55 with SRC, however, they portrayed a willingness to stay within a race when experiencing signs and
56 symptoms of SRC. Medical professionals responsible for the assessment of SRC should be
57 cognisant of younger athletes' lower attitudes scores despite having adequate CK. This is a cause
58 of concern and may prove to be an additional diagnostic challenge for medical professionals
59 working within cycling. The study findings support the view that early on in competitive cyclists'
60 careers is a key period to influence safer CA and educational strategies should place a greater
61 emphasis on the translation of knowledge to safer attitudes.

62 **Keywords:** Concussion; Cycling; Knowledge; Attitudes.

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67 feedback on the Introduction, Methods, and Results of this Study.

68 **Competing Interests:** TF is a Cycling Performance Coach and Chartered Physiotherapist working
69 within the Musculoskeletal Specialty. GB is a Chartered Physiotherapist with special interests in
70 Neurological Rehabilitation. GB is a Senior Lecturer at QMU, Edinburgh.

71 **Conflict of Interest:** The authors report no conflict of interest.

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