

Perceptions of cycling
helmet safety in
relation to sports-
related concussion
mitigation amongst
competitive cyclists

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Introduction: Concussion in cycling

- Increasing awareness over past 5 years
- Incidence rates between 5-15% (*Decock et al., 2016; Kirkwood et al., 2019; Rooney et al., 2020*)
- Disparity between knowledge and actions of rider (*Hardwicke & Hurst, 2020*)
- Attitudes influenced by macho culture, selection fears, event importance?

Perceptions of helmet safety



Helmet usage and head injury

- Strong evidence to show helmets *do* reduce skull fractures, abrasions, lacerations etc. (*Joseph et al., 2014*)
- Predominantly use computational analysis/finite element modelling and laboratory testing. (*Fahlstedt et al., 2014; Hoshizaki et al., 2022; Wang et al., 2022*)
- Limitations in predicting cognitive and mental trauma associated with concussion.
- Few studies looked at concussion and helmets in real world. (*Alfrey et al., 2021*)



Aims

1

Explore competitive cyclists' perceptions of helmet safety specifically in relation to concussion mitigation.

2

Investigate riders' attitudes towards seeking medical attention where helmet damage occurred.

3

Investigate factors influencing helmet choice.

Methods

- Online survey comprised 4 section:
 - 1) Demographic data 2) Perceptions of helmet safety 3) Medical seeking behaviour 4) helmet purchasing behaviour
- Both qualitative and quantitative data analysis methods were used
- Quantitative data analysed using descriptive and inferential statistics
- Qualitative data analysed using conventional content analysis methods
- 405 competitive cyclists (male $n = 347$; female $n = 56$; not specified $n = 1$; other $n = 1$)
- Mean age 43 ± 13 yrs
- Ability levels: Novice $n = 56$; regional/club $n = 255$; National $n = 69$; Elite/International $n = 25$

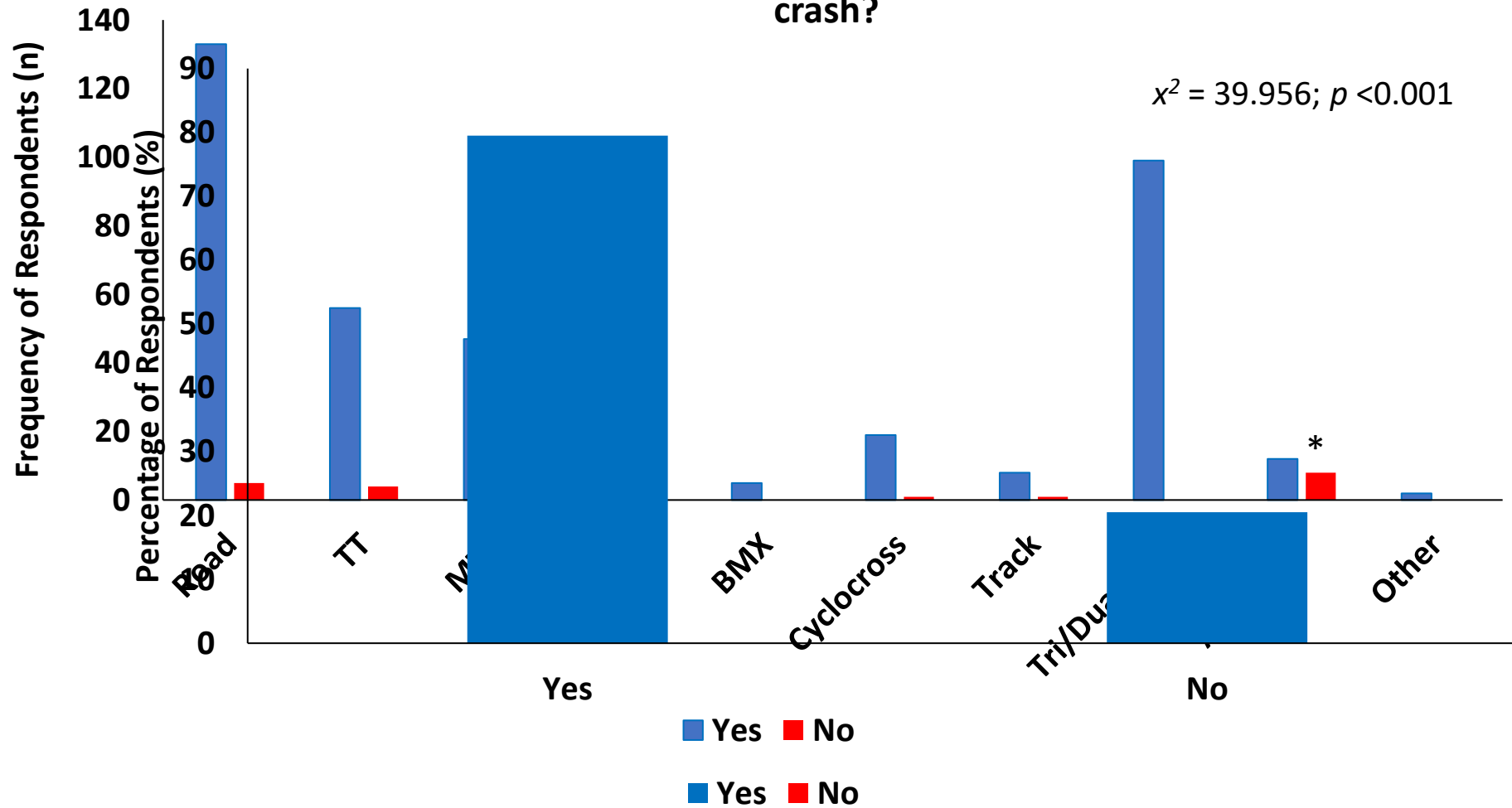
Results: Demographics

Table 2. Survey respondent frequency by bicycle racing discipline.

Discipline	Survey Frequency Response (<i>n</i> = 405)
Road cycling	138
Time trailing	60
Mountain biking	47
Downhill mountain biking	4
BMX	5
Cyclo-cross	20
Track cycling (including grass track)	9
Triathlon and/or duathlon	99
Audax/long distance	20
Other	3

Results: Perceptions of helmet safety

Would you wear a helmet in these situations, even if you did not have to? of a crash?



* indicates significantly different to 18-30 yrs.

Results: Why do you wear a helmet (or not)?

“I wear a helmet to protect my brain”

“protect my brain if I crash or fall”

“Stupid not to”

“Protection from concussion/ brain damage,
and my wife would kill me if I didn't”

“Safety, damage and concussion protection”

“No, they are useless”

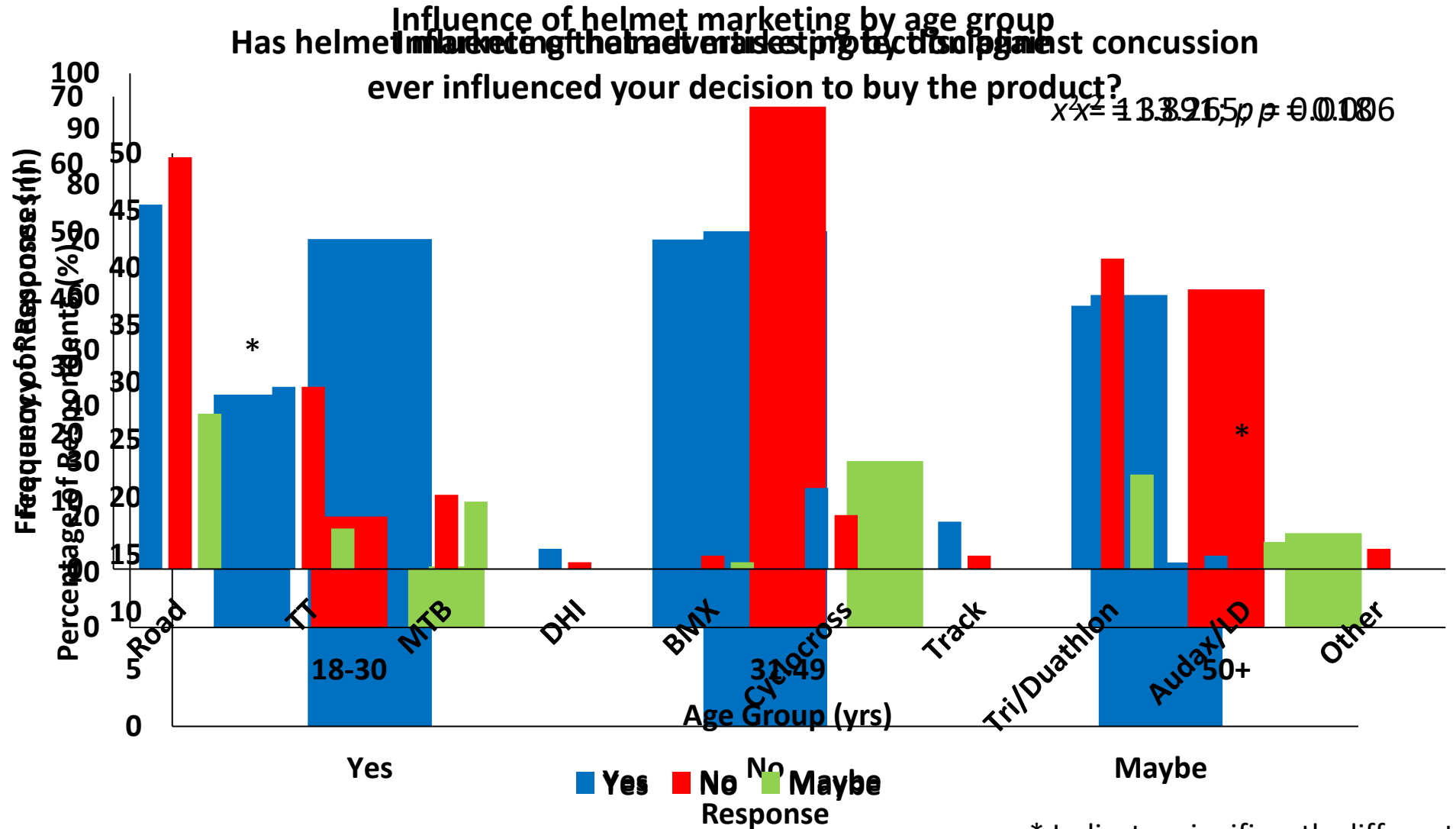
“No - I find them uncomfortable for long distance riding and I'm not
convinced they offer any safety benefit”

“I don't. One of the most over rated items ever considered”

Results: Helmet damage & medical seeking behaviour

Statement	Frequency of Likert survey responses				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<i>"I would seek medical care for potential head injuries if I had been involved in a high impact crash, but my head (and helmet) did not contact the floor."</i>	49 (12.1%)	132 (32.6%)	128 (31.6%)	65 (16.0%)	31 (7.7%)
<i>"I would seek medical care for potential head injuries if I had been involved in a crash where my helmet had been scuffed but not cracked."</i>	43 (10.6%)	149 (36.8%)	126 (31.1%)	59 (14.6%)	28 (6.9%)
<i>"I would seek medical care for potential head injuries if I had been involved in a crash where my helmet had been cracked."</i>	9 (2.2%)	47 (11.6%)	87 (21.5%)	140 (34.6%)	122 (30.1%)

Results: Helmet purchasing behaviour



Results: Do you have any comments on concussion reduction technologies?

“I don't believe a helmet can stop your brain crashing into your skull in the event of a sudden incident”

“I'm unsure on what it does and dubious to how effective it actually is”

“Important, but need publicly available scientific results and transparency, third-party evaluation”

“I fear that helmet protection may get oversold as being more effective than it really is”

“Lack of consistent information and access to information about the technology”

Key findings

- Worrying lack knowledge on protective limitations of helmets reported.
- Helmets offer a false sense of security
- Potential for risk taking behaviour to influence findings
- Generational differences
- Many riders sceptical about concussion mitigation technologies.

Conclusions and recommendations

- More governing body led education needed on the risks associated with head injuries and helmet limitations
- Manufacturer test data to be more accessible
- More independent studies needed on helmet technology
- Need for real-world data on concussion incidence/severity reduction with helmets with MIPS, WaveCel etc.

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