Public & Patient Involvement:
Questionnaire Part 2 development & validation

Iterations of Questionnaire Part 2 for reporting grip condition, type and size

**Version 1:** A questionnaire without photographs only addressing grip condition.
1) The handlebar end is intact and is not damaged
2) The rubber is damaged but no metal is exposed
3) Exposed metal is visible

**Version 2:** A questionnaire with photographic examples of grip condition.

- **Intact:** The end is intact and is not damaged.
- **Damaged:** The rubber is damaged but no metal is visible. *The word ‘visible’ was used to add clarity.*
- **Exposed:** Exposed metal is visible, or the end is a tube or you can push your little finger into the tube. *Additional descriptions added to include all situations where the handlebar end is exposed.*

**Version 3.1:** A questionnaire with photographic examples of grip condition, type and graphics for handlebar end size, also requesting photos to be emailed.

- **Intact:** The end is intact and is **not damaged.** *Colour and bold text to highlight key differences.*
- **Damaged:** The rubber is damaged **but no metal can be seen or felt.** ‘Visible’ changed to ‘seen’ to simplify language. ‘Felt’ added to ensure any handlebar with exposed metal would be classed ‘exposed’. Photographs modified to reflect updated wording.
- **Exposed:** Exposed **metal can be seen or felt, or** the end is a tube or you can push your little finger into the tube. *As above.*

- **Graphics:** Circles of 32mm and 40mm diameter were printed, along with semi-circles and measurement lines to the edge of the paper. A ‘tip’ was included “Most milk bottle tops are 40mm”. *The ‘tip’ was of particular value for online data submission.*

**Version 3.2:** Minor modification to text layout for ‘exposed’ definition.

- **Exposed:** Exposed **metal can be seen or felt or**
  The end is a tube or
  You can push your little finger into the tube.
  *Visual clarity improved by use of a new line for each option.*
Analysis of inter-observer agreement: Version 2

Aim
This PPI project aimed to test whether parents or children could reliably self-report the condition of handlebar ends using a questionnaire.

Method
39 parents and their children attending a family cycling activity were invited to independently complete questionnaire Version 2 grading the condition of each handlebar end on the child’s bike or scooter. The study investigator, who was blinded to their answers, also graded the condition. Concordance of this ordinal variable was measured using Cohen’s unweighted Kappa (κ) coefficient of interjudge agreement (Cohen 1960). Strength of agreement descriptors are as defined by Landis and Koch (1977).

Results
Parents reported the same condition as the study investigator for 67 of 78 handlebar ends (86%), κ=0.71 (95% CI, 0.55-0.87). When categories were combined into ‘intact or damaged’ and ‘exposed’, κ=0.72 (95% CI, 0.53-0.90). Children under 5 years were not invited to complete questionnaires. Parents of children aged 5-7 years tended to help their child answer, so their replies were excluded. Therefore responses from 15 children were included (median 8.9 years, range 8-12). Children reported the same condition as the study investigator for 22 of 30 handlebar ends (73%), κ=0.50 (95% CI, 0.21-0.80). When categories were combined into ‘intact or damaged’ and ‘exposed’, κ=0.45 (95% CI, 0.06-0.84).

Discussion
Given that agreement between parent and investigator was substantial, while that between child and investigator was moderate, I decided that parents, rather than children, should complete questionnaires used in the feasibility study. A further study was undertaken to assess agreement using slightly different photographic examples and subtly different wording (Version 3.2), described later in this section.

Parental ability to report handlebar condition & type without inspecting vehicle

Aim
This investigation aimed to establish whether parents could reliably report the condition of handlebar ends without first inspecting the handlebar.

Method
Parents of four children attending a cycle training course were asked to report the condition, type and size of the handlebar ends on their child’s bicycle using questionnaire Version 3.1. First, they were asked to do so without looking at the bicycle. They were then asked to inspect the bicycle and repeat the questionnaire. The study investigator inspected the bicycle to report the same attributes, blinded to the parent’s answers.

Results
When parents answered without inspecting the bicycle, agreement with the investigator’s assessment was fair, κ=0.40 (95% CI, 0.09-0.73). However, when parents inspected the bicycle
while completing the questionnaire, agreement with the investigator improved and was moderate, \( \kappa=0.59 \) (95% CI, 0.29-0.88).

**Discussion**

Given the greater agreement when parents inspected the bicycle, I decided to specify that parents should inspect the bike or scooter involved in their child’s injury when they complete this questionnaire in the study. This investigation also supports the use of a validated tool specifically developed for recording exposure to this risk factor, rather than relying upon subjective descriptions based on parental recall obtained during history taking.

**Analysis of inter-observer agreement: Version 3.2**

**Aim**

This analysis aimed to test the inter-observer agreement between parents and the investigator, using questionnaire Version 3.2.

**Method**

22 parents attending a family cycling activity were invited to complete questionnaire Version 3.2 grading the condition, type and size of each handlebar end on their child’s bike or scooter. The study investigator, blinded to their answers, also graded the condition. Parents were also invited to email photos of the handlebar ends.

**Results**

Parents reported the same condition as the study investigator for 30 of 44 handlebar ends (68%), \( \kappa=0.46 \) (95% CI, 0.22-0.69). When categories were combined into ‘intact or damaged’ and ‘exposed’, \( \kappa=0.76 \) (95% CI, 0.54-0.98). Agreement was almost perfect for reporting of handlebar end type, \( \kappa=0.92 \) (95% CI, 0.76-1.0); and was substantial for assessment of handlebar end diameter, \( \kappa=0.76 \) (95% CI, 0.51-1.0). When all three elements of this questionnaire were considered together, agreement was almost perfect, \( \kappa=0.88 \) (95% CI, 0.81-0.96). Only 3 families emailed photos, although 4 other families stated that they would.

**Discussion**

The feasibility study aims to investigate whether ‘exposed’ metal handlebar ends are a risk factor for injury. They will be compared with ‘intact or damaged’ handlebar ends in the proposed analysis. Therefore, questionnaire Version 3.2, which had the highest inter-observer agreement using the combined category ‘intact or damaged’, was selected for use in the feasibility study.

**Conclusion**

These investigations have allowed validation of the questionnaire that shall be used in the GRIP Feasibility Study to record handlebar end condition, type and end diameter. They justify asking parents (rather than children) to complete the questionnaire and asking parents to inspect the bike/scooter involved at the time of completing the questionnaire. Inter-observer agreement for the final version was almost perfect, \( \kappa=0.88 \) (95% CI, 0.81-0.96).