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RESEARCH PROJECT

EFFECTIVENESS OF SAFETY
INFORMATION ON E-BIKES AND E-
SCOOTERS: PERCEPTIONS OF
ADOLESCENTS AGED 16-19 AND SAFETY
STAKEHOLDERS

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Declaration

This dissertation is submitted in part fulfilment of the requirements of the **BSc (Hons) Environmental Health Practitioner** at University Centre Weston in partnership with The University of the West of England.

I certify that the dissertation is the original work of the author. Where the work and ideas of other authors have been used, these are fully referenced.

Printed name: ALEXANDRA WINTER

Signed:

A handwritten signature in dark ink, appearing to be 'A. Winter', written over a faint, light-colored rectangular stamp.

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Firstly, I want to acknowledge my wife for being my unyielding rock every step of the way for the entirety of these 4 years. Thank you for your endless encouragement throughout the lows and the highs and always listening to my long debriefs of the interesting things I learnt which I thought you needed to know too!

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Finally, to Bean, you are my biggest inspiration in everything. Let's hope you continue to love this planet and science as much as me. To the moon!

Abstract

E-micromobility is a steadily increasing industry of the UK's growing positive culture of sustainable transport. Despite the evidence to suggest the environmental benefits e-scooters and e-bikes provide, data on fire risks related to lithium batteries and road safety incidents reveal a complex and deeper concern on whether the rules and legislation are robust and effective enough to protect users from harm.

This research study aims to explore the understanding adolescents aged 16-19 have on the rules and laws on e-micromobility and whether this is due to issues in the current legislative framework utilised. The overall consideration will be how this information can be better communicated to adolescents to reduce their risk of harm.

A mixed method research design was utilised within questionnaires provided to adolescents and safety stakeholders within the fire service, road safety, and anti-social behaviour teams. Results were triangulated to surveys commissioned by the Department for Transport in 2020 and in 2024 along with data identified in the literature review.

Quantitative data identified that only 9% (3 participants) of the 35 adolescents had adequate knowledge on the rules related to e-bikes and e-scooters; no respondents who declared they owned their own e-bike or e-scooter responded correctly. Safety stakeholders and adolescents majority agreed that knowledge on the subject is poor within their own age group and across the public. Thematic analysis identified 5 core themes; lack of awareness of young people, lack of multi-agency support and government backing, public consciousness of safety risks, unsafe availability of products (online), and data reporting issues.

The research concludes that adolescent misunderstanding of the rules on micromobility persists and the current legislative ambiguity is exposing them to avoidable risk. Recommendations include multi-agency work within adolescent spaces to allow open discussions along with rigid government backing to improve road infrastructures and re-evaluate current safety frameworks for e-micromobility.

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1.0 Introduction

E-bikes and E-scooters (known collectively as e-micromobility) are an element of the UK's growing positive culture of sustainable transport. This form of transport is reducing carbon emissions and congestion issues along with being a more convenient form of transport for many people (Electrical Safety First, 2024). However, in 2024 the Office for Product Safety and Standards (OPSS) received reports of 170 fires linked to e-bikes (45% of those were conversion e-bikes, bikes converted using battery kits) and 39 fires involving e-scooters (OPSS, 2025). A large majority of these fires are occurring in family homes and as a result there were 8 fatalities in 2024 (OPSS, 2025).

Despite evidence to suggest the environmental benefits which e-micromobility provides (zero-emission and low carbon goals) (Parliamentary Advisory Council for Transport Safety, 2025), there are concerns which counter this. The increased consumption of lithium-ion batteries has correlated with an amplified need for the extraction of metals, which are related to environmental impacts such as habitat destruction and water pollution (Christensen et al, 2021). Additionally, many of these batteries are not disposed of correctly, which reportedly caused an estimate of 201 fires in 2024 due to a lack of regulatory controls and recycling schemes. This figure is steadily increasing meaning 48% of all waste fires are costing the UK economy £158 million per year (British Safety Council, 2024).

The London Fire Brigade have stated that lithium-ion batteries are the fastest growing fire risk in recent years. The main risk with lithium-ion batteries is related to thermal runaway. This occurs when a battery cell overheats and causes the structure of the battery to collapse resulting in the venting of flammable and toxic gases, fire and explosion (Electrical Safety First, 2024). This heat spreads to other battery cells and causes them to also enter thermal runaway, which is especially dangerous in properties with multiple e-bikes or e-scooters stored in the same place.

Transport for London has banned the use of e-scooters (all types) on all TfL services and as of March 2025, non-folding e-bikes (including conversion bikes) have also been banned on the services due to the fire and toxic gas risk (Transport for London, 2026). Other transport operators across the UK have also emulated this action and in many cases banned all e-micromobility transport on their services (Electrical Safety First, 2024). This is evidence that large companies are starting to realise the risks that e-micromobility poses and are attempting to alleviate it through the means that they have available to them.

However, the risks related to e-micromobility are more than just fire risks. In 2023, there were 1,117 road casualties of e-scooter collisions; 6 people were killed and serious collisions (injuries of lacerations, head injury, and fractures) made up 343 of these numbers (Department for Transport, 2024). It was found that the most common age group for casualties was the 10-to-19-year age group and the evidence collected showing the time of day that many of these incidents happened was around 5pm (Department for Transport, 2024).

The Department for Transport (Ipsos, 2025) reported that in 2024 2% of the public owned an e-scooter and 4% of people have used a privately owned e-scooter or a rental e-scooter over the previous 12 months (representative sample of 7,091 individuals aged 16+ across the UK); e-bike usage was reported at 9% of people having used one in the last 12 months. A highlight from this research was the data collected relating to the rules around e-scooters. The Department for Transport (Ipsos, 2025) found that three in ten did not know the correct answer to the 4 statements posed relating to legal usage on roads and pavements.

Electrical Safety First and Road Safety Trust independently conducted research on e-micromobility within their areas of interest. The studies mutually reported that the Incident Recording System (IRS), a national data collection system, has no category listed for 'e-bikes' and 'e-scooters' and either the Police or Fire Officers must record this in an open text box. Information which is entered into an open text box does not appear within the Home Office published statistics (Parliamentary Advisory Council for Transport Safety, 2023). This emphasizes a major concern around how accurate the reporting of e-bike and e-scooter incidents have been which increases the potential for the related risks to be evaluated incorrectly.

Adolescents in the UK are still using e-vehicles incorrectly after purchasing from sellers and this has resulted in seizures of vehicles or receiving fines. The strategies for public and stakeholder engagements have been developed for adults and the ways to communicate risk to adolescents is not utilised effectively. Adolescents experience 'egocentrism' and an 'illusion of vulnerability' which makes them believe they are far too unique to be affected by bad things which can result in poor decision-making (Youth and Policy, 2018). Social media is a useful tool for delivering risk communication as it can be shocking and attention-grabbing. As Weinstein (1980) discusses, if an individual learns more about a group of people that have experienced a risk, they will better understand their own vulnerability and therefore optimism bias will be reduced. Similarly, Bandura (2004) suggests that adolescents are a difficult group to communicate risk to but are much more

likely to experience risk (Hang et al, 2023). Weinstein (1980) also suggests that by utilizing the social cognition theory adolescents who observe others are likely to re-shape their own behaviour based upon these observations.

1.1 Research Question

This project seeks to answer the following research questions:

Is the current safety information and legislation available regarding e-scooters and e-bikes clear and understood (specifically by age 16-19 adolescents)?

1.2 Secondary Research Question

What are the risks of the information not being understood by this age group and how could this information be communicated effectively?

1.3 Objectives

To assess the above, the following objectives will be considered:

- 1) To determine if adolescents understand the rules and regulations relating to micromobility and to what extent they feel that other people also understand them (and if this differs across the age groups)
- 2) To determine if safety stakeholders (Fire Service, Road Safety Organisations and Anti-Social Behaviour Teams) think that adolescents understand the rules and if not, what are the barriers to this understanding
- 3) To determine whether the knowledge of these groups demonstrates gaps in the rules and regulations in relation to effectiveness and robustness.
- 4) To provide recommendations on how the regulations could be improved to be better understood by adolescents to reduce their risk of harm.

2.0 Literature Review

2.1 Search Strategy

The initial literature review was conducted across academic databases (Google Scholar, JSTOR and The University of West England) utilising specific search terms including more recent literature around 'road safety', 'adolescents', 'e-bikes', 'e-scooters' and Boolean operators. This was to ensure strict inclusion and exclusion criteria to enable a strengthened focus. The search returned 50 results but none of these directly addressed the posed research question, highlighting a research gap. Therefore, related themes were explored within the literature identified which allowed for a wider scope on the related issues to this topic.

After removing duplicates, records were screened before subsequent full-text analysis was conducted on 32 records. 13 sources were selected to be included based upon their quality and relevance to the research area. A PRISMA flow diagram has been supplied in Appendix A to show this process along with a summary table of the key sources in Appendix B.

Grey literature from the Department of Transport, the Office of Product and Safety Standards, Fire Services, Metropolitan Police, the Police Reform Act 2022 and the Road Traffic Act 1988 was also reviewed to strengthen the analysis.

2.2 Legislative Framework

There is no specific legislation which has been created exclusively for e-micromobility creating a grey area of enforcement. However, all e-vehicles have a classification of 'powered transporters', meaning they are classed as motor vehicles under the Road Traffic Act (1988). The rules that apply to motor vehicles also apply to e-scooters (insurance and certain licence categories) (Metropolitan Police, 2026). E-bikes can be ridden without a licence or insurance if you are 14 or over (under 14s are prohibited to use e-bikes) but there are specific rules to ensure they are classed as EAPCs (electrically assisted pedal cycle):

- The e-bike cannot be propelled when it's travelling at 15.5 mph (miles per hour)
- The markings on the bike must show the manufacturer, the rated output and the battery voltage (Department of Transport, 2025a).

Due to the classification of e-bikes and e-scooters as motor vehicles, the Police Reform Act (2002) applies. Section 59 is used by the Police to seize e-bikes and e-scooters if the user is not following the rules and therefore using the vehicle in an 'anti-social manner' (Metropolitan Police, 2026).

E-scooters (privately owned) also have an additional set of rules which cause further confusion with legal compliance. It is illegal to ride in public on pavements, roads and in parks. You can only use your privately owned scooter on private land with landowner's permission. Whereas rented e-scooters can be used on public roads and cycle lanes but not on pavements or motorways (Department of Transport, 2025b).

The Department of Transport launched rental schemes in specific locations, for example, boroughs in London, Milton Keynes and Oxford for a planned 5-year period running from 2022 to 2028. The intention was to develop an idea of usage, safety and environmental impact (Transport for London, 2026).

However, the Office of the Police and Crime Commissioner (PCC) stated in an open letter response to road safety campaigners that there was mutual agreement that trial e-scooter campaigns have led to confusion for people as the rules for private e-bikes then become unclear. The lack of information provided at point of sale of the e-vehicles to consumers is also highlighted as a key issue within the PCC response.

2.3 The Related Risks

The fire risks related to micromobility have been highlighted extensively in the media, but the literature suggests issues with regulatory compliance not keeping pace with these e-devices. The National Fire Chief's Council state that the biggest concerns related to these types of fires is that they are prone to re-ignition after being extinguished and release toxic gases which are a risk to the public and firefighters (National Fire Chief's Council, 2023). This recognises that the issues with e-vehicles is not solely due to lack of consumer education but also a lack of technological pre-release testing and safety flaws.

Additionally, the ease of availability to sub-standard products is a major issue with seller websites allowing sellers to advertise converted e-bikes with little to no consumer advice at a highly reduced

price of a standard e-bike. There is a brief insight into the difference of price and quality of e-bikes on the market below which tempts the consumer into purchasing the cheaper option:



Figure 1 – Screenshot of a live advert of an e-bike on AliExpress (AliExpress, 2026).



Figure 2 – Screenshot of a live advert of an e-bike on Halfords (Halfords, 2026).

Research and more advanced data collection has been conducted internationally on rider behaviour such as tandem riding; Geo et al (2025) utilized studying fluctuations in acceleration and turning patterns (indicative of added weight of another passenger). This research is more compelling than collecting self-reporting of tandem riding due to the risk of participant bias. However, an Athens study suggests that collisions with cars remain the cause of over 80% fatalities compared to e-bikes and e-scooters (Athens International Transport Forum, 2024). There is potentially contradictory evidence within the survey which highlights that the number of injuries on e-vehicles are rising as use increases, but the danger related to people using a shared scooter scheme is reducing as people become savvier.

Furthermore, this suggests that findings are not comparable, as rental schemes operate under stricter controls and differ substantially from the largely unregulated private market. Burt and Ahmed (2023)'s data supports this critical consideration with the analysis of the Parliamentary

Advisory Council for Transport Safety (PACTS) data estimating that private e-scooters account for 69% of e-scooter casualties.

Helmets are recommended on e-bikes and e-scooters but there is no legal requirement in the UK (even shared use e-vehicles) and remains to be studied on a wider scale with larger sample sizes.

De Blacam and Keating (2025) provide insight into the severity of paediatric injury. Their study conducted in Ireland focused on 4 under 16s who had received severe facial abrasions, lacerations and dental injuries following accidents on e-vehicles. This study cannot be generalized to a wider population due to its small sample size. Similarly, Travers et al (2022) identifies the accessibility issues caused by improper parking of e-vehicles but with no comparison to the current issues caused by motor vehicles being improperly parked indicates a lack of generalisation which would be useful to assist in research for marginalised groups (those with disabilities who require easy access on roads and pavements).

2.4 Public Awareness of the Legislation and Risks

I am Road Smart (2025) shared data that detailed updated figures of nearly 800 children aged 14 and below who have been caught riding a private e-scooter without a licence in the last 5 years which highlighted an increase in offences but could be related to a push on proactive policing such as the TVP 'Engage, Educate, Enforce' campaign. Similarly, Road Safety GB (2025) have produced data indicating that many 17–21-year-olds have been served with IN10 offences (using a vehicle uninsured against third party risks) and these offence numbers have increased over the last 3 years. This data suggests that there is a 'legal trap' whereby e-vehicles are sold legally in high street shops, but the consumer becomes criminalized once purchased due to being unable to insure them for road use. The PCC (2024) report that TVP have seized 118 e-scooters between June and September 2024: the most common reason was due to the illegal use of these e-vehicles on pavements and careless use on the roads. Furthermore, TVP argue that ongoing educational work within schools and communities is required but this overlooks the need for potential infrastructure integration on the roads and bike-lanes to keep riders safe.

As Travers et al (2022) suggests, punitive measures are the suggested approach instead of planning and adapting transport networks for e-micromobility. Additionally, it would reduce the risk of vulnerable riders at intersections (Mwambeleko, 2022).

2.5 Evidence of Misinformation despite Public Messaging

The National Fire Chiefs Council (NFCC) (2025) is calling for urgent action from the government to strengthen product safety rules, improve battery disposal, regulate online sales and increase public awareness to address the growing risks of lithium batteries. However, conversely the British Safety Council (2024) argue that there is still a gap between the awareness of health and safety professionals and fire risk assessor's comparative to the incidence of lithium-ion related fires. A survey was carried out on 500 organisations between September 2023 and February 2024 and this revealed that 71% of respondents had not updated their risk assessments to cover lithium-ion battery fires and only 15% had done so. However, once again this data fails to allow generalisation due to small sample and feedback frequency and requires continuous data collection to provide useful insights. A follow up study on businesses following several insurances companies' decisions to change the status of lithium-ion batteries to 'recognised risk' would serve as an additional requirement for companies to mitigate the risks further as they would need to provide evidence of awareness in their assessments (British Safety Council, 2024).

Research conducted in Bristol, on rental schemes, found 61-69% had never used an e-bike, 77-84% had never used an e-scooter. This study also reported that e-bike users preferred to use their own whereas e-scooter users mostly hired them; finally, that there was more support for the use of e-bikes than e-scooters (Armstrong et al, 2025). The research suggests that rental schemes are not utilised as much as is perceived but the study has been conducted in a localised area and therefore, the ability to generalize in this way is not supported. Similarly, Pizzani et al (2022) established via a study in Norway that most riders drove well below the maximum legal limit and that under 35s were observed using rental scooters and utilising the cycle paths when available. This could be the result of cultural norms as compliance with legislation is likely to differ in different countries. Observational studies can be problematic due to association being found rather than causation as the variables are not controlled by the researcher, considering that the data is also snapshot of a single time point (Rezigalla, 2020).

2.6 Educational Intervention

Thames Valley Police (2024) launched an ongoing Road Safety Strategy as an effort to reduce road fatalities and injuries. The intention is to collaborate with local authorities to share data and technology, emphasise public health education and create awareness campaigns. However, this proposes whether 'softer' measures are as effective as 'harder' measures which could be in the form of stricter regulation on e-vehicles specifically. It is unclear whether the current data on the infrastructure of e-micromobility is detailed enough for data -sharing between organisations to be feasible.

The push on educational interventions is occurring in all safety stakeholder areas, the NFCC (2025) urge that a co-ordinated national public education campaign is required to highlight the risks. However, the NFCC are urging policymakers to not only consider lithium-ion batteries but all emerging energy technologies. They argue that regulatory frameworks must be flexible and responsive to keep up with technological innovation.

Electrical Safety First (2025) is campaigning for the proposed legislation 'Safety of Electric-Powered Micromobility Vehicle and Lithium Batteries Bill' which has been drafted in partnership with the NFCC, London Fire Brigade and Zurich Insurance. The three main areas focused on are safety assurance – safety assessment for all e-vehicles with lithium batteries before they enter the market, responsible disposal – regulations for disposal from UK Government and comprehensive fire safety – setting firmer standards on conversion kits and charging systems with consideration for a ban on the sale of universal chargers.

2.7 International Approaches

Internationally, the research on e-vehicles and micromobility is ongoing and appears to be of interest to a multitude of countries. The United States have now surpassed 1 million units of e-bikes sold which has outpaced the amount of electric vehicles sales; this is reportedly due to the increased access and relative cheapness of e-bikes (Mwambeleko, 2022). However, there is a strengthened effort to regulate these e-bikes such as the Fire Department of New York's (FDNY) approach. In 2024, they inspected 585 e-bike shops which was a 25 increase from the previous year. The FDNY also report 426 summonses, 138 violation orders, 32 criminal summonses and the seizure

of thousands of unsafe lithium batteries and chargers (National Fire Protection Association, 2026). However, this approach to the rapid market of e-vehicles has forced safety regulators to react instinctively to the risks rather than proactively manage the risks. Additionally, the abilities of the FDNY have a contrasting position to the London Fire Brigade who do not hold the correct legislative powers to inspect, seize or ban unsafe products as this product safety regulation remains at the National Level.

Conversely, regulation in the US is reported to vary widely whereby licensure is only required in 7 states and age restrictions and helmet use differs across 35 states. This appears to be a significant gap in the legislation as the most frequently reported injury for e-bike users was head related. E-bikes can also be ridden on sidewalks and in bike lanes which contrasts with UK legislation (Atkinson and Atkinson, 2025).

Research conducted on shared e-bike users and using shared helmets on the schemes in the Netherlands and they found that no participant said they wouldn't use a helmet due to safety, but many people were concerned about hygiene issues. However, the sample size was small and social desirability bias was acknowledged (Alkema, 2025). Helmets appear to have been a safety focus in other studies around the world. An analytical study conducted on accident records in Israel found that severe accidents are occurring at rates which don't match the proportion of e-vehicles on the road similarly to the records identified by the Department for Transport in the UK. It was identified that lack of safety equipment e.g. helmets is the focus of many accidents and injuries reported (Khalemsky et al, 2023).

2.8 Identified Gaps and Rationale for the Study

There has been significant research on the risks related to e-vehicles but there is limited data and reporting on what adolescents' understanding of the rules and regulations are, particularly whether this information has been communicated to adolescents effectively. This study seeks to explore these gaps in knowledge and aims to provide insights into what information is being communicated effectively but also how this communication can be improved to reduce the risks for riders, whereby answering the overarching research questions.

3.0 Methodology

This research has adopted a mixed method (quantitative and qualitative) design which follows a pragmatist paradigm. Questionnaires via Google Forms were created for the following groups with a variety of questions written in the format of open and closed questions:

- 16 -19-year-olds
- Fire Services across London and the South of England
- Anti-social behaviour teams across London and the South of England
- Prominent Road Safety Charities

Triangulation of the collected data was achieved by comparing and finding relationships between the qualitative and quantitative data. Data validation was achieved by utilising findings from other data sources in this subject area (School of Health Sciences, n.d.).

3.1 Mixed-Methods Research Design and Research Philosophy

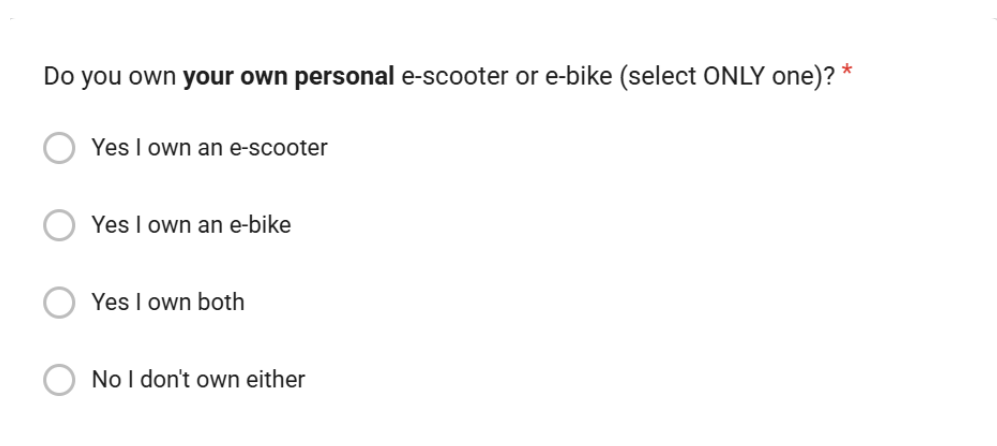
Mixed methods research design was chosen for this research as it is utilised well in creating the understanding of the situation and meaning. Additionally, mixed methods research adds value within a research question which combines the two strengths of qualitative and quantitative research (Wasti et al, 2022). Quantitative research is strong in its capacity to generalize numerical data to a wider population and focus on testing hypotheses or theories (Lim, 2025). Qualitative research is typically expressed in words rather than numbers which has been utilised through open questions within this research questionnaire, and this allows the focus to be on understanding experiences, perspectives and contexts (Creswell and Poth, 2018).

A mixed-method design allows a researcher to seek a wider view of the study by providing them with different perspectives and data (Dawadi, 2021). This coincides well with the goal of this research focusing on a deeper understanding and a more detailed overview of the subject (Wasti et al, 2022). The research philosophy of pragmatism suggests that there are many ways to interpret the world using this paradigm to investigate reality provides a broader understanding of the subject matter (School of Health Sciences, n.d.). This paradigm is suitable due to the research being meaningful and useful and it orientates towards 'what works in practice' (Dawadi, 2021).

3.2 Justification for Questionnaires

Questionnaires were chosen for this study as they are a cost-effective way to collect data from a larger number of populations compared to other methods such as interviews (Marshall, 2004). They can also provide confidentiality and anonymity for participants if administered correctly (Lee, 2006) which was crucial for this study due to the need for collection of data from adolescents.

However, there are disadvantages of this method. Questionnaires can be difficult to be utilised by non-English speakers or those with any visual or literacy issues. The researcher was unable to clarify any confusions caused by the questionnaire due to their indirect method framework which is why ensuring the questions have been created to be 'user friendly' and not using specialist language (Marshall, 2004). For example, the use of boldfaced words or phrases within the context of a question can serve to clarify potential confusion (Lee, 2006). An example of how this concept was utilised is shown below:



Do you own **your own personal** e-scooter or e-bike (select ONLY one)? *

☐ Yes I own an e-scooter

☐ Yes I own an e-bike

☐ Yes I own both

☐ No I don't own either

Figure 3 – Screenshot of a question created in Google Forms for the pilot questionnaire.

The questionnaires utilised open and closed questions. Closed questions are quicker and easier to answer. They are also easier to compare different respondent's answers which was employed within the adolescent questionnaires. However, there is a risk of simplistic responses to complex issues. Open questions which were used within the safety stakeholder's questionnaires provided an opportunity for respondents to give their opinions and their own self-expression was permitted, however open questions can cause difficulty with degree of detail and relevance in answers (Lee, 2006).

The researcher's initial approach was to send questionnaires to schools across the London Boroughs, but this yielded a low response rate. Therefore, the researcher took on a different approach and utilised youth groups and youth council's which allowed for snowball sampling to be utilised. Additionally, 2 questions which were formulated for college students were removed as there was uncertainty as to whether this applied to all participants.

3.3 Pilot Study

A pilot study was employed in this research to test the research protocols and research techniques in preparation for the full study. This increases the study's reliability and reduces the potential for bias, known as construct validity (Tabari-Khomeiran et al, 2024). The study was piloted out via purposive sampling to a group of 16–19-year-olds via a connection with the researcher's place of work. The positive of testing a questionnaire with the intended participant is that the responses given will advise the researcher as to whether the questions are comprehensible and appropriate (Hassan et al, 2006). The pilot questionnaire was created to be identical to the full study with an additional question at the end to allow the participant to provide any feedback on potential changes and to advise how long the questionnaire took them (see below).

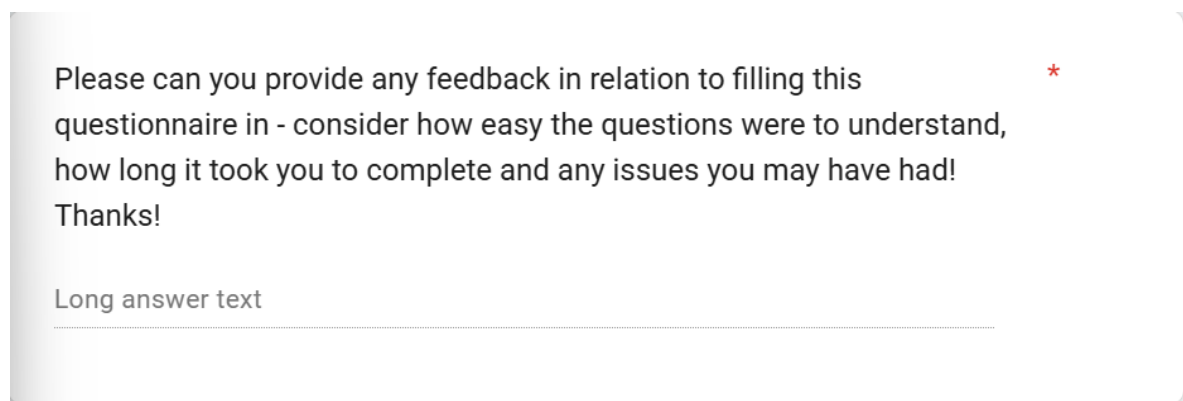
A screenshot of a Google Form question. The text of the question is: "Please can you provide any feedback in relation to filling this questionnaire in - consider how easy the questions were to understand, how long it took you to complete and any issues you may have had! Thanks!". To the right of the text is a red asterisk icon. Below the text is a text input field with the placeholder text "Long answer text". The form has a light blue border and a white background.

Figure 4 – Screenshot of a question created in Google Forms for the pilot questionnaire.

Following on from the pilot study, there was a useful suggestion as to how the participant was able to navigate back to a previous question. This highlighted an issue as three of the questions were worded to test the knowledge of the participant and then provide them with corrective feedback (see Appendix D) relating to safety on micromobility. This issue would have allowed for skewed

results due to retrospective bias if not resolved before the full study. Therefore, this capability was removed from the form and the issue resolved. The response regarding the amount of time the survey took the pilot participants was also useful as it verified that it could be completed in a minimal time frame.

3.4 Data Analysis Approach

The quantitative data collected from closed questions in all questionnaires was analysed utilising descriptive statistics. Descriptive statistics allows the data condensed into useful information on the participant population (May, 2017).

The qualitative data collected in the safety stakeholder questionnaires was analysed via inductive thematic analysis. Braun and Clarke (2006) formulated the 6-step thematic analysis process framework which has been utilized broadly in research. The inductive approach is best for the data collected as the codes emerged organically from the data and this meant the analysis was more flexible and adjustable throughout (GradCoach, 2024). The thematic analysis was conducted systematically throughout the results section and the discussion to ensure reflexivity, transparency and alignment with the research question (Ahmed et al, 2025). Vivo coding via quotations from questionnaire answers were coded further into keywords and then using patterns of meaning formulated into themes (GradCoach, 2022).

3.5 Participants and Ethical Considerations

Ethical approval was obtained via the university's formal ethics committee which ensures the university guidelines were followed as well as the General Data Protection Regulations (GDPR), a copy of this code of ethics Appendix E. Participants were provided with an information sheet and consent form, these forms differed between participant groups as the language used for the adolescent information sheet was simplified to ensure understanding (Appendix F). The documents ensure informed consent is given via providing clear information on what would happen to the participant's data and the right that they had to voluntary participation (Information Commissioner's Office, 2025).

The collection of data from adolescents within the age range of 16-19 years old required careful decision-making to ensure they were provided anonymity and confidentiality (Bhandari, 2025). It was important to ensure that the dispersion and instructions regarding the questionnaires was via responsible adults to the 16–19-year-olds (Loughborough University, 2026). The first question within the questionnaire re-requested informed consent to continue and if the participant answered ‘no’ then the link was closed and no further questions were asked. Google Forms was utilised for this research as the participant could be provided with a direct link to the questionnaire and no email address or contact information was required to be collected. This further ensured that no identifying personal information was collected from any participant.

3.6 Limitations

It is important to highlight the limitations of the research. The smaller sample size restricts some generalizability to the wider public which creates a greater emphasis on ensuring the triangulation of data is conducted proficiently to ensure data validity and reliability is increased as much as possible (Tipton et al, 2017).

There is a potential that bias may have been introduced via the researcher’s current role within a local authority. To mitigate this, questions were considered and tested via the pilot study to ensure that the questions were not ambiguous and ensured the chosen method of data collection was suitable (Baldwin et al, 2022).

3.7 Triangulation

Triangulation is a key component of mixed-methods research as data triangulation is generally accepted as a strategy for validating your results between the quantitative data and the qualitative data (Dawadi, 2021). By providing questionnaires to not only the focus of the study (the 16+ adolescents) but to the Fire Service and Road Safety charities as well, there was a possibility of proving stronger inferences than using one method would.

Data triangulation was achieved by comparing the data from the adolescents with the safety stakeholders and then compared to the results and feedback from the Kantar survey commissioned by the Department for Transport in 2020 and the Technology Tracker produced by the Department

for Transport in 2024. Themes and elements found within the literature review will also be utilized to align with broader trends which are identified within the data results.

3.8 Aligning the Objectives

Table 1 below will indicate the objectives identified in the introduction to support the overarching research questions and how they will be achieved within this research project.

TABLE 1

Objective Number	The aim of where it will be achieved
1) To determine if adolescents understand the rules and regulations relating to micromobility and to what extent they feel that other people also understand them (and if this differs across the age groups)	Quantitative Questionnaires
2) To determine if safety stakeholders (Fire Service, Road Safety Organisations and Anti-Social Behaviour Teams) think that adolescents understand the rules and if not, what are the barriers to this understanding	Mixed Method Questionnaires
3) To determine whether the knowledge of these groups demonstrates gaps in the rules and regulations in relation to effectiveness and robustness.	Quantitative Questionnaires Mixed Method Questionnaires Triangulation
4) To provide recommendations on how the regulations could be improved to be better understood by adolescents to reduce their risk of harm.	Quantitative Questionnaires Mixed Method Questionnaires Literature Review Discussion

4.0 Results

The key findings will be identified in this section from the quantitative questionnaires completed by the 16–19-year-olds and the mixed-methods questionnaires completed by members of anti-social behaviour teams, fire safety officers, and a mixture of road safety officers working for charities and local authorities. All questions and raw results can be found in Appendix G,H and I. The charts below were created in Excel from input data.

4.1. Key Statistics for 16-19 year old adolescent respondents

The following figures outline the results from 35 respondents aged between 16 and 19 years of age.

Figure 5 shows that this is further broken down into:

- 17 x 16-year-olds
- 4 x 17-year-olds
- 9 x 18-year-olds
- 5 x 19-year-olds

There were two responses from 20-year-olds and two responses where the participant declined to consent to complete the questionnaire. These have all been removed as they were directed away from completing the remainder of the questionnaire. Almost half of the respondents were 16-year-olds, the next largest response was from 18-year-olds. Figure 5 correlates to supporting Objective 1.

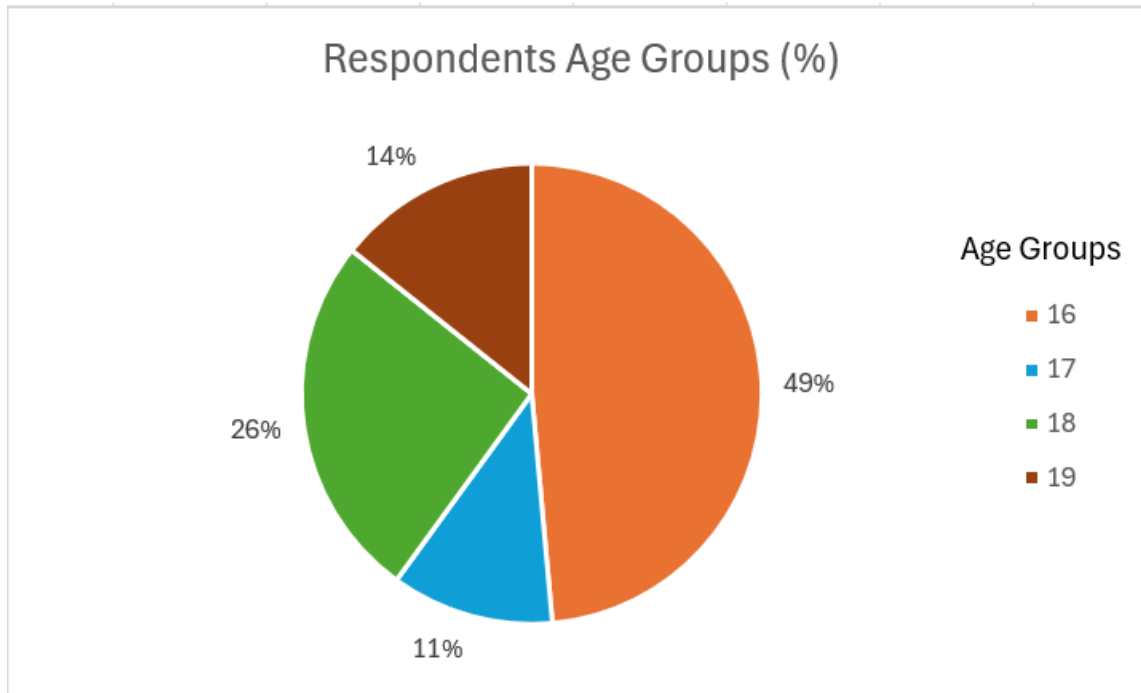


Figure 5: A pie chart illustrating the breakdown of responses by age.

Participants were asked to indicate whether they owned an e-bike or an e-scooter, or both or neither. The mode response was 'No, I don't own either an e-bike or an e-scooter'. Figure 6 directly correlates to supporting Objective 1. Only 18 and 19-year-olds indicated that they owned e-bikes or e-scooters or both.

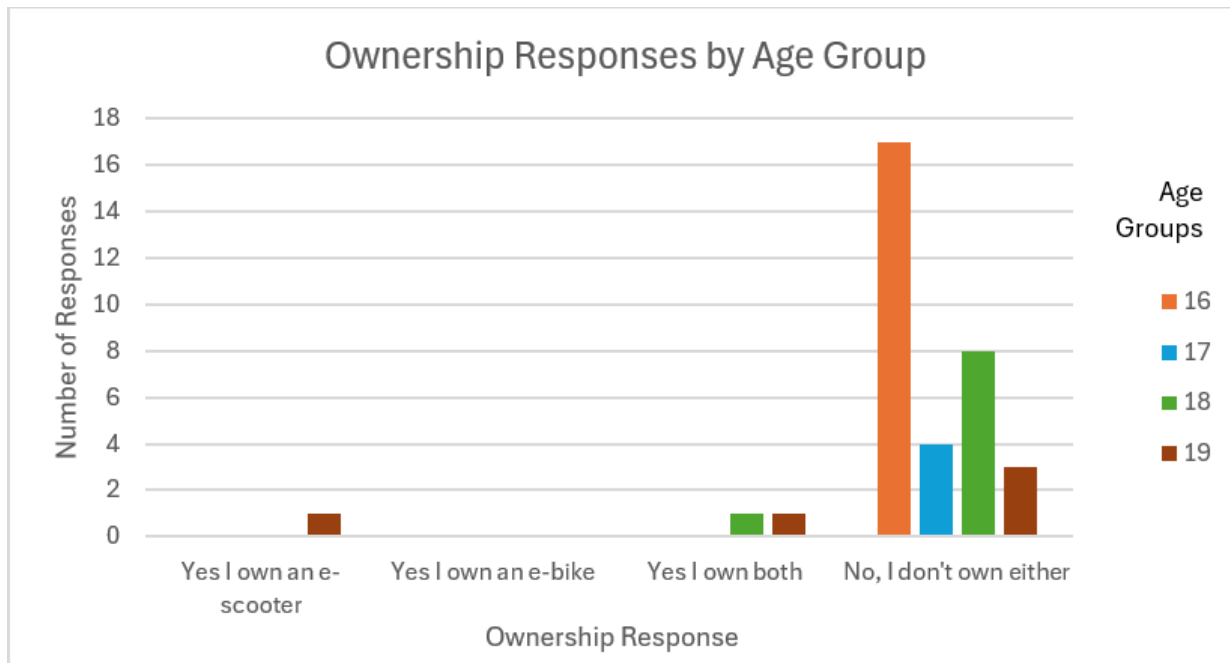


Figure 6: A bar chart illustrating the responses on ownership differences and the related age groups.

The participants were asked whether they had ridden on an e-scooter, either rented by themselves or by a friend. Figure 7 illustrates the response to this question. The majority response was 'No'.

Have you ever ridden on a rented e-scooter, either
rented by yourself or your friends?

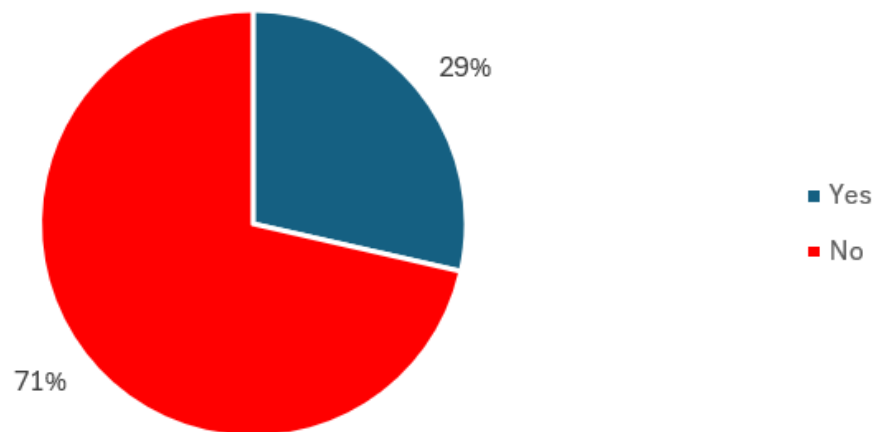


Figure 7: A pie chart illustrating the responses on rental schemes or use of e-scooters via friends of the participants.

The participants were asked three knowledge-based questions relating to the rules on micromobility. They were provided with multiple-choice answers to choose from. The questions and multiple choices are listed below in Figure 8:

Figure 8

		Answers
Q1	Where do you think you can use your own e-scooter ?	Your garden The park Your friend's garden Pavements Through town
Q2	How fast can an e-bike go legally in the UK before it is considered a motor vehicle?	12mph 15.5mph 28.5mph
Q3	How many points can you be awarded on your provisional or full driving licence if you have not purchased insurance when using a rented e-scooter ?	None 3 6 9

The figures 9, 10, and 11 indicate responses to knowledge questions and multiple-choice answers. If any wrong response was chosen for the multiple choice, then the response was logged as incorrect.

77% of the responses to Question 1 were incorrect. None of the 19-year-old participants answered this question correctly. Figure 9 directly correlates to Objective 3.

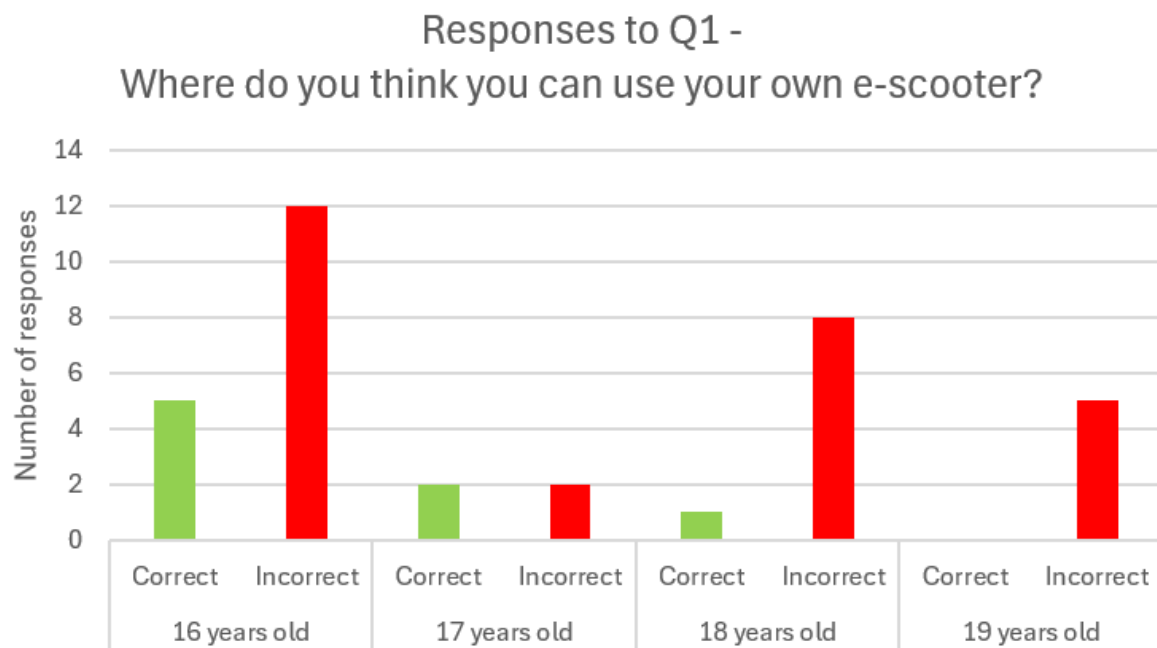


Figure 9: A bar chart illustrating the incorrect and correct responses to Q1.

54% of 16, 18, and 19-year-old responses to Question 2 were also incorrect. 46% of the responses were correct. Participants aged 17 years old all answered this question correctly. Figure 10 directly correlates to Objective 3.

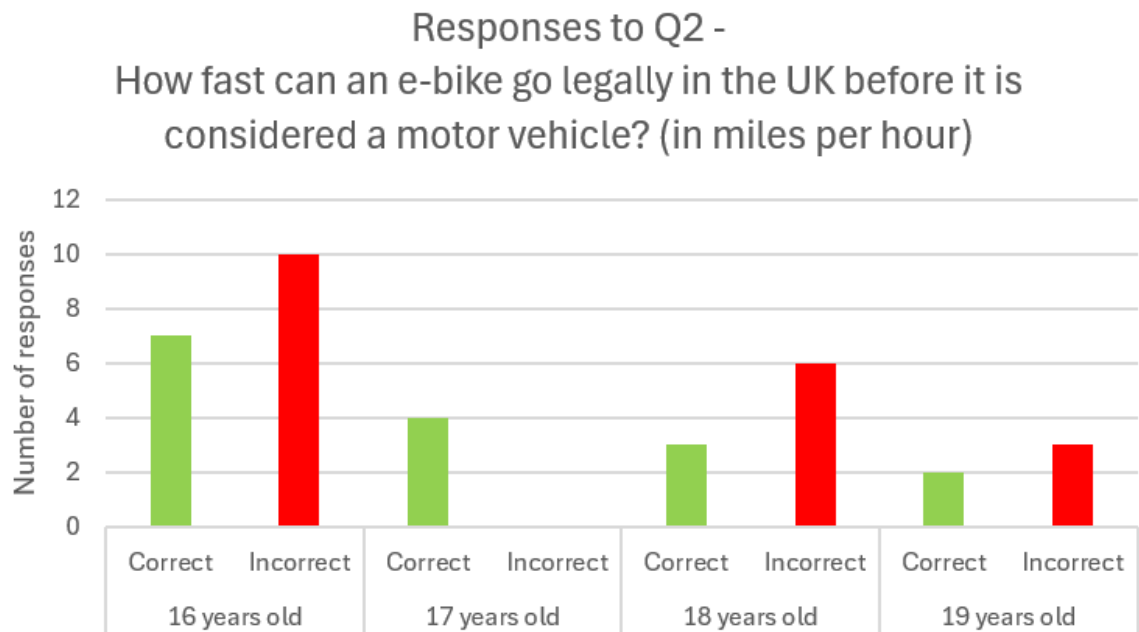


Figure 10: A bar chart illustrating the incorrect and correct responses to Q2.

71% of the responses to Question 3 were incorrect. 29% were correct responses. Figure 11 directly correlates to Objective 3.

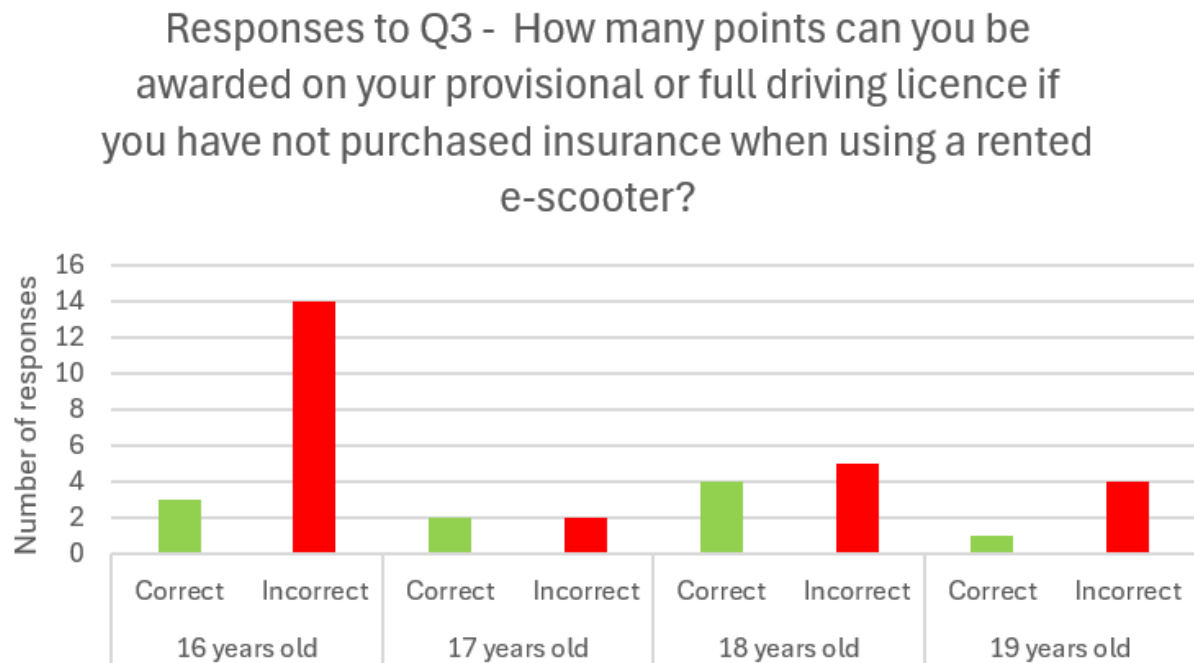


Figure 11: A bar chart illustrating the incorrect and correct responses to Q3.

The participants were asked to select from a 5-point Likert scale measuring agreement with the statement relating to the public's knowledge on e-bike and e-scooter rules and laws. There were no responses selected for 'strongly agree'. The most common response across all age groups was 'disagree'. Figure 12 directly supports Objective 1.

Please choose one option to show how much you agree with this statement - 'The rules and laws on the use of e-bikes and e-scooters are common knowledge among the public.'

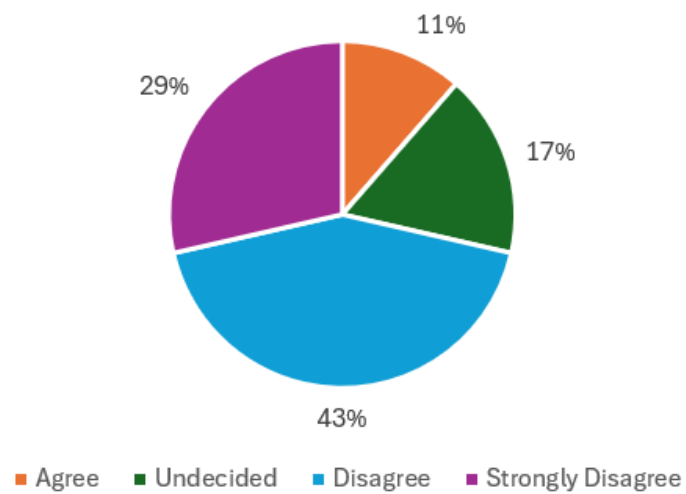


Figure 12: A pie chart to distinguish the responses to the Likert scale.

The following graph shows the age breakdown of responses to the Likert question above. There were no responses across all age groups for 'strongly agree'. 16-year-olds and 19-year-olds were the only two groups to have 'agree' within the selected responses. No 19-year-olds selected 'strongly disagree' compared to the other 3 age groups who did. Figure 13 directly supports Objective 1.

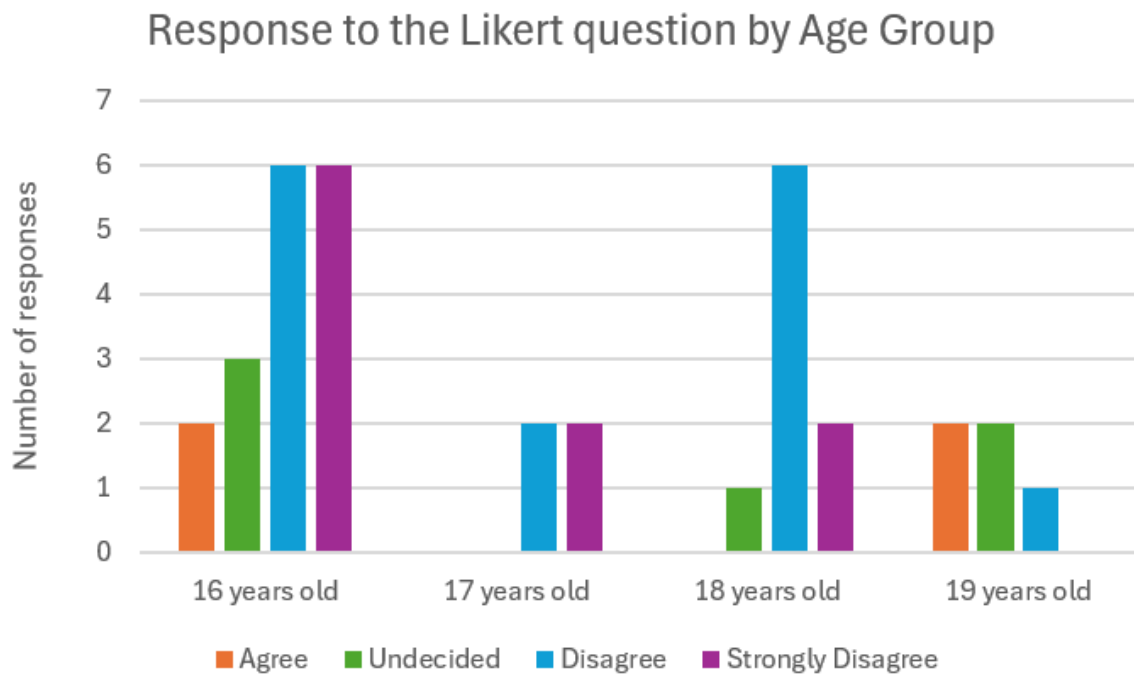


Figure 13: A bar chart to show the responses to the Likert scale by age group.

4.2 Key Statistics for Safety Stakeholder respondents

The following figures outline the responses from 10 total safety stakeholder responses. 5 were from road safety officers, 4 from fire officers and 1 response from an anti-social behaviour officer. The following figure shows the breakdown of how many responses were received from each of the safety stakeholder groups. Figure 14 assists in supporting Objective 2.

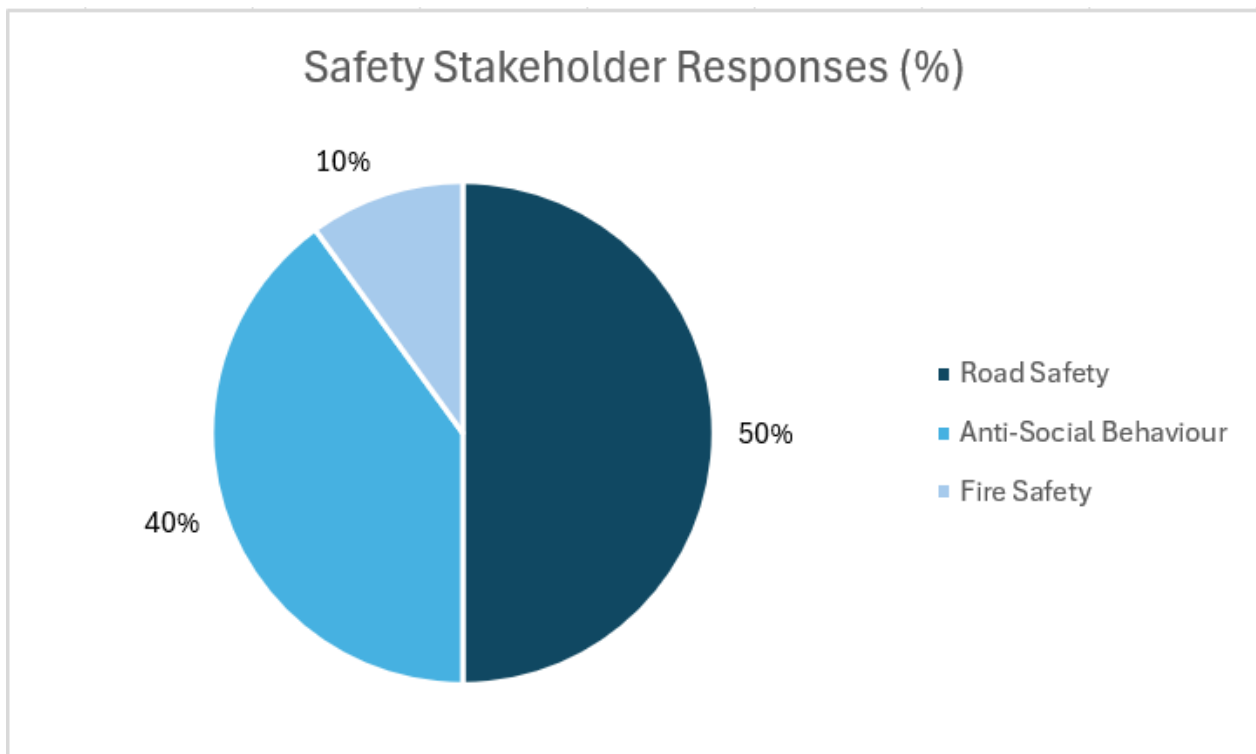


Figure 14: A pie chart to illustrate the breakdown of responses per safety stakeholder.

Due to a low response number, the safety stakeholders will be considered as one group for the following two figures. Figure 15 assists in supporting Objective 1. The most common response (90% total) to the statement posed to all safety stakeholders was 'No'.

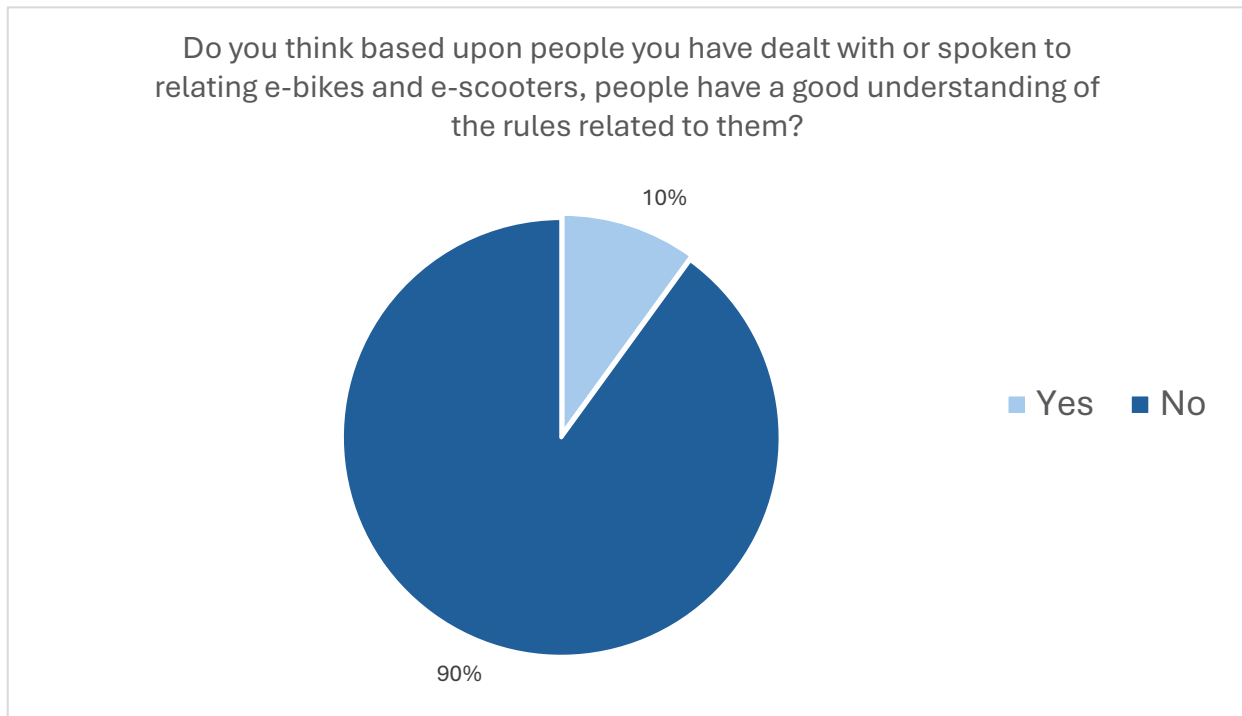


Figure 15: A bar chart to show the breakdown of safety stakeholder's response to whether they feel that the public in general have a good understanding.

All safety stakeholder participants were asked on a 5-point Likert scale measuring agreement about how aware they felt 16–19-year-olds were of the rules and regulations. The most common response was 'Not at all aware'. Figure 16 directly supports Objective 2.

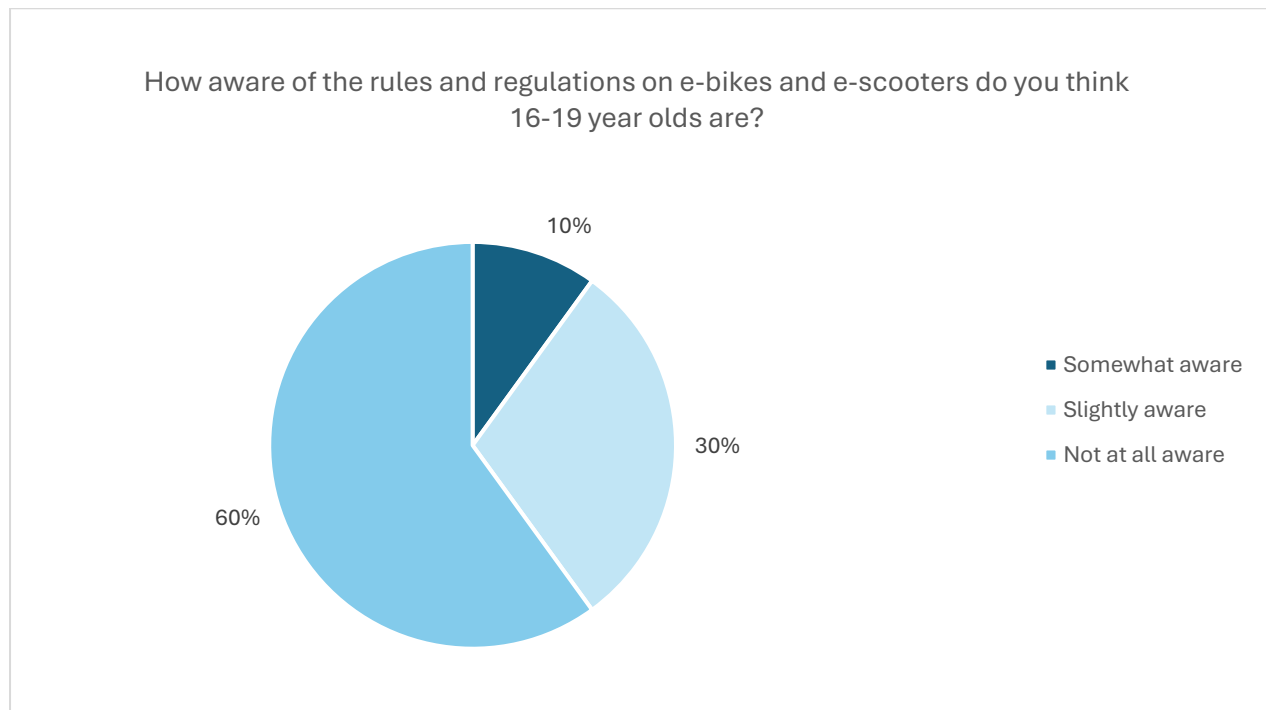


Figure 16: A pie chart to show how aware safety stakeholders feel that 16-19 adolescents understand the rules.

Figure 17 and 18 are all based around responses from the Fire Service. Figure 17 shows the 5-point Likert scale measuring agreement from the participants based upon their experiences in relation to the statement posed. No participant selected 'Not a problem at all' or 'A minor problem'. Figure 17 supports Objective 3.

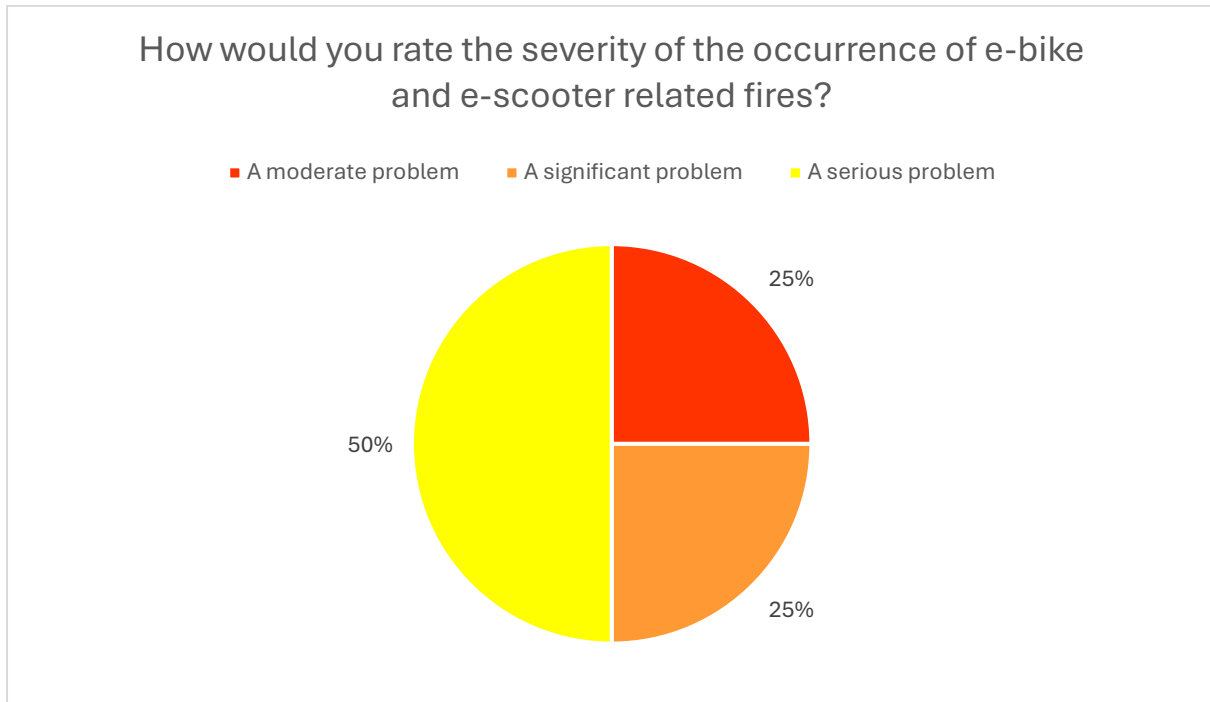


Figure 17: A pie chart to show the selections made by the Fire Service participants in relation to the statement.

Figure 18 shows the 5-point Likert scale measuring agreement from the participants based upon their experiences in relation to the statement posed. All participants selected 'A serious problem'. Figure 18 supports Objective 3.



Figure 18: A pie chart to show the selections made by the Fire Service participants in relation to the statement.

Figure 19 and 20 are all based around responses from the Road Safety participants. Figure 19 shows the 5-point Likert scale measuring agreement from the participants based upon their experiences in relation to the statement posed. No participant selected 'Not a problem at all', 'A minor problem' or 'A serious problem'. Figure 19 supports Objective 3.

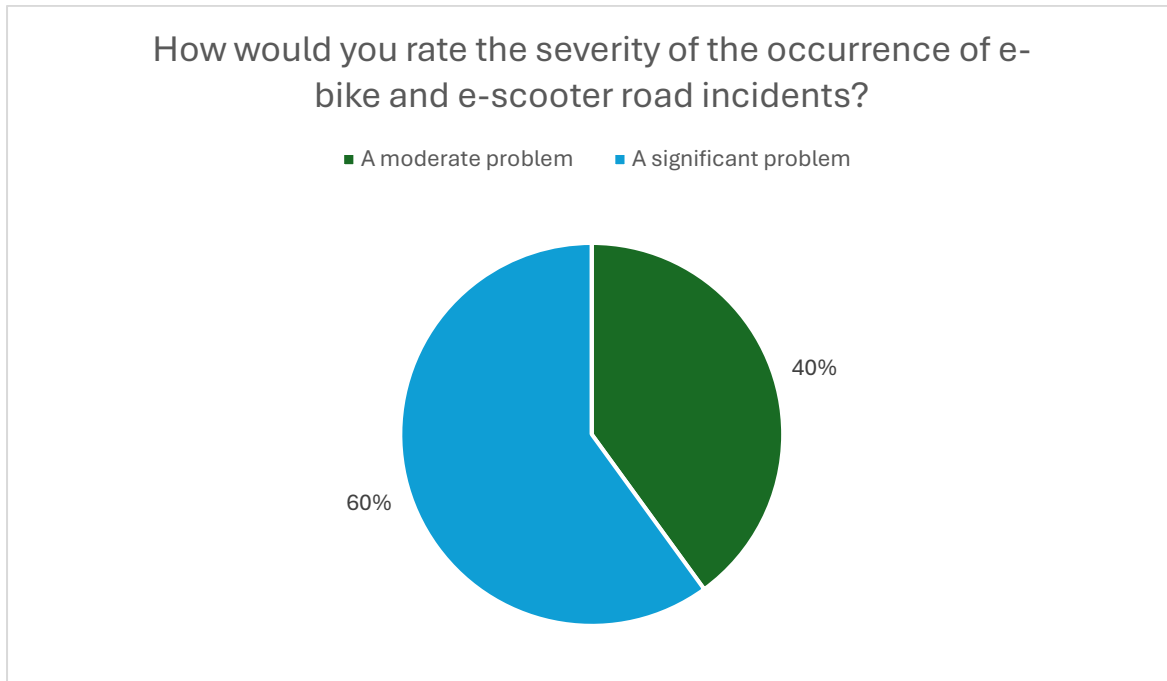


Figure 19: A pie chart to show the selections made by the Road Safety participants in relation to the statement.

Figure 20 shows the 5-point Likert scale measuring agreement from the participants based upon their experiences in relation to the statement posed. No participant selected 'Not a problem at all' or 'A minor problem'. Figure 20 supports Objective 3.

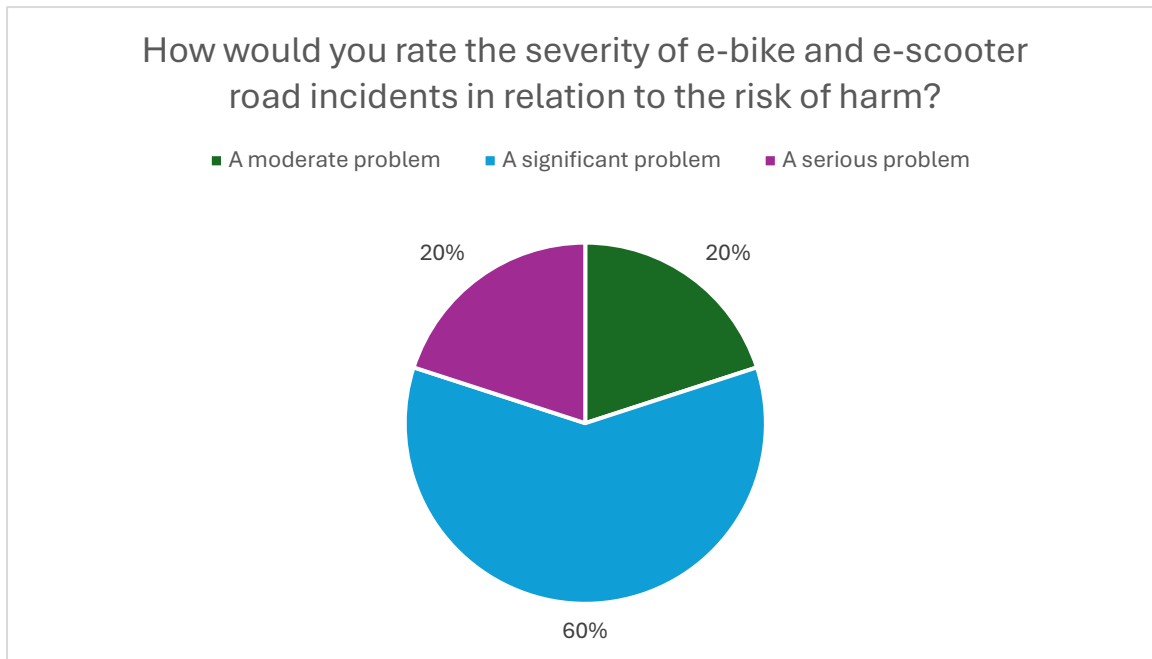


Figure 20: A pie chart to show the selections made by the Road Safety participants in relation to the statement.

Figure 21 is from the solo response of an Anti-Social Behaviour officer and shows the 5-point Likert scale measuring agreement from the participant based upon their experience in relation to the statement posed. The participant selected 'A minor problem'. Figure 21 supports Objective 3.

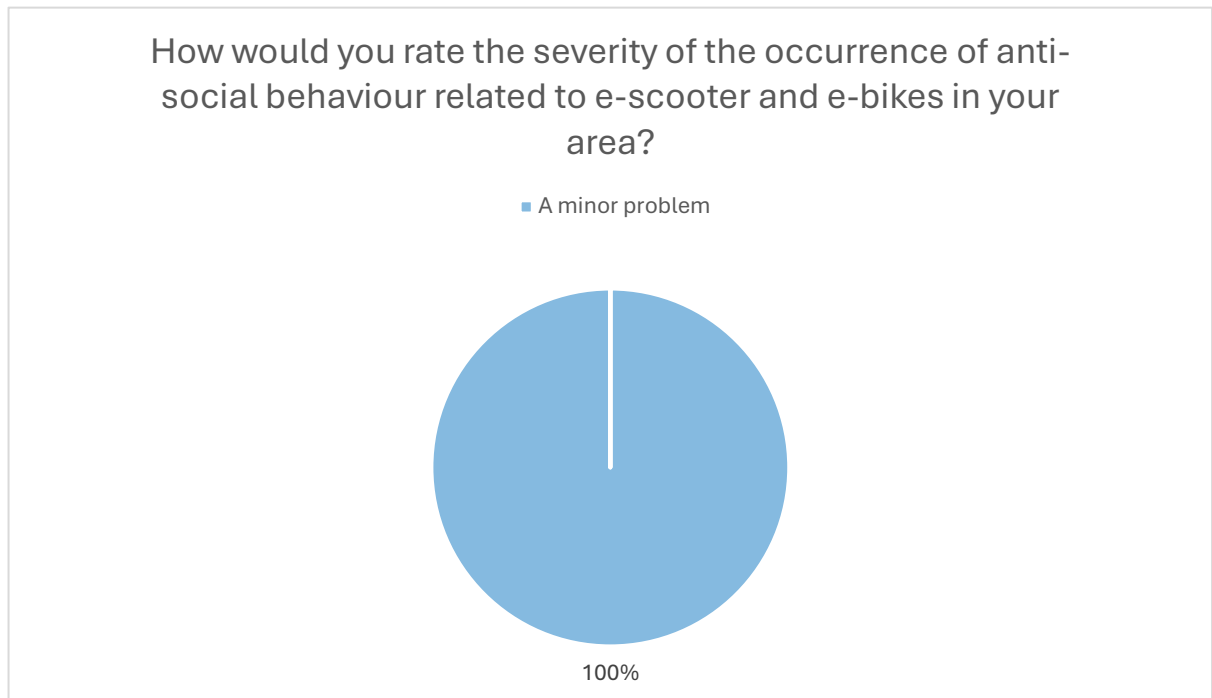


Figure 21: A pie chart to show the selection made by the ASB participant in relation to the statement.

4.3 Thematic Analysis

The following details the result of the inductive coding and reflective thematic analysis carried out. Table 2 shows the key words and codes found and then the overall themes identified. The thematic analysis directly supports objective 2,3 and 4. The full thematic analysis can be found in Appendix J.

Key Words/ Codes	Themes
Young People Risk Awareness	Lack of Awareness of Young People
Retailers Conversion Products Cheap Products	Unsafe availability of products (online)
Multi-agency support Restrictions needed Government support	Lack of multi-agency support and government backing
Under-reported data Better data sharing	Data Reporting Issues
Targeted Messaging Publicity Poor Public Knowledge	Public Consciousness of Safety Risks

TABLE 2

5.0 Discussion

The primary research question of this project was to gain understanding on whether the current safety information and legislation on micromobility has been understood correctly with a focus on adolescents aged 16 to 19 years old. The following findings will acknowledge that the research questions have been addressed and that adolescents do not have a solid foundation of knowledge on the rules related to e-micromobility.

The objectives were identified throughout the results section and the findings associated will be acknowledged with further consideration to other research and the relevant literature discussed.

5.1 Analysis of Quantitative Findings

It was found (Figure 6) that older teens were more likely to own their own e-scooter or e-bike and this totalled out to 9% of the total participants. However, Figure 7 shows that the figure for renting or riding an e-scooter owned by a friend is higher than private ownership at 29%. This indicates that the use of shared rental schemes may be higher than private ownership in the UK.

The above findings did differ from an assumed amount of how many adolescents were expected to own their own e-scooter and e-bike. The results found in Figure 6 correlate to the Bristol rental scheme study (Armstrong et al, 2025) whereby 61-69% had never used an e-bike and 77-84% had never used an e-scooter. This study's findings were similar at 71% never having used an e-scooter.

The knowledge-based questions in the adolescent questionnaires aimed to highlight their understanding. The results from across the 3 questions were:

- 77% of adolescents did not know where you were allowed to ride an e-scooter
- 54% of adolescents did not know the legal speed of an e-bike
- 71% of adolescents did not know the how may points on your licence you can receive from not correctly insuring an e-scooter

A detailed breakdown uncovers that only 3 out of 35 (9%) of adolescents got all three questions correct and this was a 16-year-old and two 17-year-olds. This demonstrates that no adolescent in this research who owns a private e-bike or e-scooter got any of the knowledge questions correct which establishes a deep lack of efficacy of the rules and regulations. There is some assertion that there may be more knowledge on e-bikes than e-scooters due to the higher number of correct answers on this question.

If the results from Figures 6 to 11 are integrated together there is a gap in the knowledge of adolescents highlighted. A higher percentage of adolescents in the study stated they use rented scooters however, in the knowledge-based question based upon where they can ride private e-scooters saw the lowest number of correct responses. Participants selected 'pavements', 'on road; and the 'the park' which implies adolescents think the rules are the same for private e-scooters as well as rented. These findings indicate that the failure in adolescent knowledge is occurring structurally rather than individually, whereby the rental schemes normalise e-scooter use without differentiating the legal rules. As a result, adolescents are internalising compliance norms that do not apply to private e-scooters, increasing their risk of enforcement action and harm.

Figure 12 shows that 72% of participants had a negative response to the statement posed in the Likert scale 'The rules and laws of on the use of e-bikes and e-scooters are common knowledge among the public'. Interestingly, the 3 adolescents who answered all the knowledge-based questions correctly selected 'disagree' and 'strongly disagree' on the Likert scale question. This proposes that they are aware that their peers have limited or less knowledge than them.

Corrective feedback was used within the adolescent questionnaire to ensure that any incorrect knowledge was corrected which was ethically important to do. Corrective feedback is when information is given as an immediate response to a 'learner's action', in the case of this research this is when each one of the three knowledge questions were asked of the adolescents. This feedback was imperative to this research project due to the significance of ensuring that when the knowledge was tested, the instant feedback given when 'next' is clicked, served to reinforce knowledge to correct mistakes or reinforce correct answers (eduMe, 2026).

This corrective feedback may have influenced the adolescent's responses to the Likert scale question as the participants were made aware of the gaps in their knowledge and then asked whether they thought knowledge was common amongst the public. These responses gain strong insight as the format of the questions might have reduced the social desirability bias. The adolescents would not have felt the need to be deceptive to enhance their self-presentation as the questionnaire was formatted in a way which did not require them to feel they were being tested (Gower et al, 2022).

There was less quantitative data collected from the safety stakeholder questionnaires. However, there were key insights found. Figure 15 shows that 90% of safety stakeholders who participated in

the study agreed that the public in general have a bad understanding of the risks and rules related to micromobility and they specified that they thought 16–19-year-olds were ‘not at all aware’ of the rules and regulations. None of the safety stakeholders indicated that they thought adolescents or the public in general had a good understanding of the rules and this aligns with the results from the adolescent questionnaires.

5.2. Analysis of Qualitative Findings

This research utilises mixed-methods data which means it is important to discuss the findings from the thematic analysis and the quantitative data from the safety stakeholder questionnaires in conjunction with each other. The theme of public consciousness of safety risks is discussed throughout rather than specifically focused upon.

As shown in Figure 14, the safety stakeholders were broken down into Fire Service officers (FS), an Anti-Social Behaviour officer (ASB) and Road Safety officers (RS).

Lack of Awareness of Young People

The safety stakeholders identified that the prevalence of the e-scooter rental schemes give the impression that the use of all e-scooters on roads and pavements are legal when this isn't the case. This issue was identified via the quantitative data as well which illustrates this as a core problem.

There was a suggestion that the information shared for adolescents needs to be conducted via age-appropriate means on social media and it needs to be shocking. This coincides with the social cognition theory identified by Weinstein (1980), the concept that adolescents are more likely to reshape their behaviour when faced with real examples. This research contends that the persistence of adolescent misunderstanding suggests that current risk communication strategies lack sufficient ability to distinguish between the categories of e-micromobility. Accordingly, exposure alone to messaging is unlikely to cause compliance without clear regulatory framework.

Unsafe availability of products (online)

The wide extent of e-micromobility devices available online and advertised via the algorithms utilised by mainstream apps and websites creates an uncontrollable issue. Consumers do not often question why products are being sold to them if the products cannot be used freely and if the fire hazards related to the batteries and charging products sold with them are that severe. The safety stakeholders identified the suggestion that the items with lithium batteries should be given with clear guidance like tobacco products; this would also assist with verifying the supplier of the product if safety standards were implemented. The FS officers indicated in Figure 17 that occurrences of fires related to e-bike and e-scooters were a 'serious problem' and all the FS officers chose that the risk of harm was a 'serious problem' in Figure 18. This data correlates to the figures detailed in the OPSS report (2024).

Lack of multi-agency support and Government backing

The safety stakeholders outlined that more guidance needs to be provided on the safe charging of e-bikes and e-scooters along with targeted messaging on fire hazards that can arise when modified products are bought. This connects to the unsafe availability of products theme identified along with the 90% agreement of safety stakeholders that the public has limited understanding identified in Figure 15.

The FS officers specifically identified that they felt electrical safety knowledge for the public is minimal. There was a consensus that schools and colleges should be gaining awareness on these issues to enable them to deliver information to students. This concept would need government level guidance which is clear, concise and age appropriate.

Data Reporting Issues

The RS officers agreed across the responses that the data on incidents relating to micromobility are unreliable due to under reporting of the issue. An RS officer highlighted that the incidents are not recorded correctly on the STAT19 form which was also raised by Electrical Safety First.

The STAT19 is a form compiled of data collected by Police when a road collision/ injury is reported to them. The STAT20 form currently advises grouping motorized vehicles together which means that e-scooters are not identified separately and e-bikes are not identified at all on the form or the guidance form (Department for Transport, 2024b).

The RS officers chose in Figure 19 that the occurrences of road safety incidents related to micromobility were a 'significant problem' along with the 'significant' harm the majority chose in Figure 20. However, it is difficult to triangulate these statistics to the current known occurrences due to the issues in data reporting. By failing to categorise e-bikes and e-scooters consistently, current reporting mechanisms risk normalising micro-mobility related harm within wider motor statistics. As a result, policy responses may underestimate the urgency of required intervention, particularly for adolescents.

5.3 Triangulation

The KANTAR study conducted for the Department of Transport in 2024 on 4,046 adults aged 16+ concluded that 18% of respondents had their own e-scooter. The Technology Tracker report produced by IPSOS (2025) for the Department of Transport was based upon a survey of 7,091 individuals aged 16+. This study also found that e-scooters and e-bikes had low ownership rates and although there was a percentage of people who were considering buying one in the next 12 months, these numbers were low too. These studies are larger in comparison but when scaled down, this matches the findings.

KANTAR conducted a knowledge test as well, but this was specifically on e-scooters. Only 9% correctly answered all questions and 29% (3 in 10) did not know the correct answer to any of the questions. 39% of 16–20-year-olds thought that e-scooters can be ridden on roads or cycle lanes. This correlates to this study's findings which found that 77% of respondents thought you could use private scooters 'in the park', 'through town' or on 'pavements'. This research argues that the consistency between these datasets strengthens the validity of the identified knowledge gap, rather than reflecting methodological bias. The absence of measurable improvement over time suggests a lack of progress in effective policy understood by adolescents, despite the increase in use of e-micromobility.

There is a risk outlined using the results of Figure 11 which relates back to the theme of the 'lack of awareness of young people'. The question was asked; 'How many points can you be awarded... if you have not purchased insurance when using a rented e-scooter?'. This indicates that adolescents are generally unaware of the legal implications as many of the responses were either 'none' or '3'. I am Road Smart (2025) mentions that many 17–21-year-olds are unaware they need insurance for rented e-scooters, and this has resulted in offences being given to them.

1 in 6 (28%) participants thought it was legal to use private scooters on pavements in the KANTAR (2024) study which was an issue highlighted by the safety stakeholders - 'They don't realise that private e-scooters are illegal'. This asserts that more educational interventions are required in this area.

The KANTAR (2024) and the IPSOS (2024) study were focused upon ascertaining the attitudes towards e-micromobility technology. The positives of e-scooters and e-bikes were identified by members of the public as: their convenience, speed and their environmental advantages. Their disadvantages were the risks that busy roads pose, users not knowing the rules and the lithium battery fire risk. These factors match the themes identified by the safety stakeholders; conversely, it highlights the consideration that the public are aware of the risks posed by e-scooters.

5.4 Limitations and Reflection

A significant limitation of this research was the fact that questionnaires can yield low response rates. A high response rate can indicate a greater likelihood that the survey is representative of the target population whereas comparatively a low response rate could indicate potential bias due to non-response error (Kantar, 2025). The strategies suggested to reduce low response rates is to keep your questionnaire short, optimise the response for smartphones to be used and complete a pilot survey which were all integrated into this research (Shiyab et al, 2023). However, due to time constraints, even though the allowance pre-planned in the Gantt chart for the survey responses was extended, this did not increase the number. Snowball sampling ended up being more effective, as the researcher was able to ask participants to spread the questionnaire information and link to their friends or from trusted adults to their adolescents who matched the age range along with utilising contacts with youth groups. This would be the ideal sampling technique used if this research was

replicated. Additionally, several safety stakeholders were difficult to contact and this limited the ability to ascertain correct conclusions from the responses given.

A larger number of respondents with an increase in qualitative data would increase the quality and richness of the data collected and therefore result in a greater impact on generalizability. The low response rate does not invalidate the findings of this research but instead required careful discussion of the information found and for that reason are considered more exploratory (Vanderpoel, 2024). Nevertheless, this study maintains that the merging of stakeholder perspectives, national datasets, and primary findings supports the credibility of the conclusions despite limitations in sample size and response rate.

An important note to make is that socio-economic status was not taken into consideration in this study due to the size and scale. These factors would have an impact on the ownership of e-scooters and e-bikes along with differences in locations and the differences between different ethnic populations (Yan, 2023).

5.5 Recommendations

The secondary research question and final objective identified the need for this study to highlight key recommendations for adolescent communication and improvements on regulations going forward in e-micromobility.

A key initial step in improving the risk communication to adolescents would be to create a safe environment, in schools or youth groups, to have an open discussion on their ideas and viewpoints on the rules around e-micromobility (Child Mind Institute, 2025). The use of survivors of e-micromobility incidents like fires or severe accidents speaking with adolescents would allow the optimism bias to be reduced and adolescents would relate to the survivors via emotive language and recognise their own vulnerabilities (Youth & Policy, 2018).

The literature review conducted found that the proposed legislation 'Safety of Electric-Powered Micromobility Vehicle and Lithium Batteries Bill' by Electrical Safety First (2025) would be a positive move forward. This research advocates that regulatory intervention should not be delayed pending further research, as the current legislative ambiguity is exposing adolescents to avoidable risk.

It is key that improvements on information and guidance are not a moving target for safety. Due to latent failures identified in accident causation models (Weigmann, 2022) in implementing micromobility into road infrastructure and restrictions on unsafe products being on the market, avoidable deaths have occurred.

Long-term goals for implementation of improved road infrastructure would satisfy public opinion (60% of KANTAR respondents) to allow private and rented e-scooters to be legal on cycle lanes. The number of micro-mobility devices appears to be increasing; this, combined with the Government push for net zero by 2050 (Department for Energy Security & Net Zero, 2023), would acknowledge the Government's commitment to improve the safety of micromobility going forward.

The KANTAR (2024) study identified some key recommendations based upon public perceptions; 85% of respondents thought helmets should be compulsory. This would be successful in reducing incidents and head trauma to users of micromobility vehicles, especially adolescents as identified in the international studies conducted.

5.6 Conclusion

This research project set out to examine the main research question, 'Is the current safety information and legislation available regarding e-scooters and e-bikes clear and understood (specifically by age 16-19 adolescents)?' and to acknowledge what the 'risks of the information not being understood properly' were and 'how the information could be communicated effectively?'. Throughout the examination of qualitative and quantitative questionnaires provided to adolescents and safety stakeholders, available legislation, and literature analysis, this study has exposed a gap in the expected knowledge of adolescents and the useful awareness that safety stakeholders hold in the micromobility space.

The knowledge-based questions revealed that 91% of adolescents are not clear on the micromobility rules, even if they own their own e-scooter or e-bike. It was revealed that the adolescents themselves (72%) do not think that they have 'common knowledge' on the rules and regulations which was further supported by the agreement of 90% of safety stakeholders. The data collected indicates that no specific measure has been put in place to ensure that adolescents have been directly informed of the rules.

The requirement for more guidance and legislative review is clearly identified in the 5 core themes: Lack of Awareness of Young People, Unsafe Availability of Products (online), Lack of Multi-Agency Support and Government backing, Data Reporting Issues and Public Consciousness of Safety Risks. The data reporting issue needs to be resolved as a priority as this would serve to identify the realities of the issue. Fire incidents and road incident numbers are excessive and require a more rigorous legislative framework to remove the risks that consumers are unknowingly buying into. Although, whilst ownership of micromobility devices appears low across studies at approximately 9%, there is evidence to suggest that the use of these devices will continue to grow, and the risks need to be mitigated before they continue to worsen.

The conclusion drawn from this study is that adolescent knowledge of the rules on micromobility is not sufficient for their safety. There needs to be a multi-agency approach which utilises listening-based approaches alongside real case studies provided by safety stakeholders e.g. The Fire Service, Road Safety representatives and companies which have carried out extensive research. These approaches need to be backed by Government support to improve the information provided to adolescent riders of micromobility devices, rather than utilisation of inconsistent enforcement approaches. Whilst some companies have already used their own tactics to mitigate the risks (such as the bans used by TFL), a strong consistent Government approach should encompass the knowledge of companies committed to raising awareness and the frontline safety stakeholders who are dealing with daily issues that micromobility risks are causing. This project contributes to an under-explored gap in research and literature and provides recommendations rooted in evidence which could shape the development of future policies and improve overall e-micromobility safety to adolescents in the UK.

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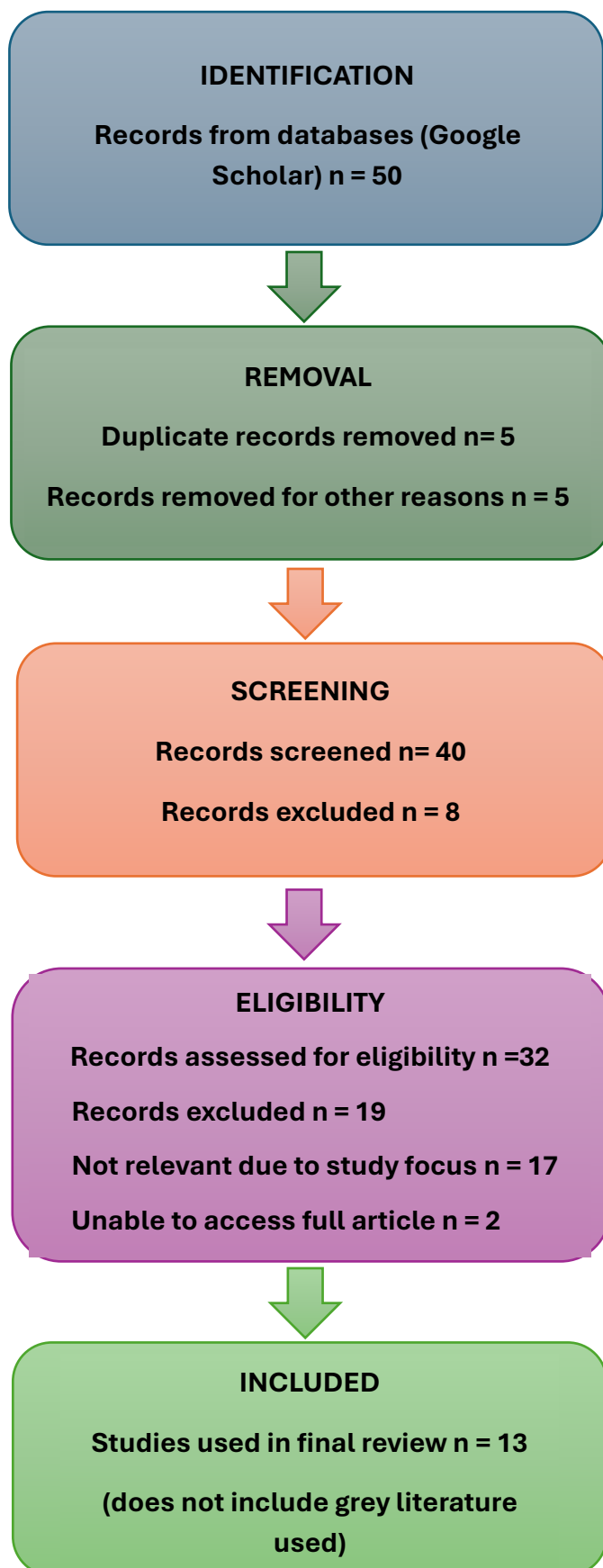
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7.0 Appendices

7.1 Appendix A – Prisma Flow Diagram



7.2 Appendix B – Summary Table of Key Sources

Author(s)	Date	Type of research	Methodology details	Key findings	Ethical considerations	Critical points	Reference details
Atkinson, E and Atkinson, T	2025	Research Article – quantitative data	US Emergency data analysed using Frequency, rider age, involvement of motor vehicles, drugs/alcohol use, and pedestrian involvement	E-bike injuries accounted for 28.2% of injury cases (two-wheeled), 13-19 year age group seen a rapid increase in occurrence. Drug and alcohol affects were rare	Complied with ethical research guidelines	Large increases in injuries reported by 13-19 years old but adults 30-14 highest. E-bike injuries numbers have risen faster than moped injuries over time. Head injuries are concern as more severe incidents reported with e-bikes.	Atkinson, E. and Atkinson, T. (2025) 'Injury patterns and safety implications for electric bikes compared to mopeds in the United States'. <i>Traffic Injury Prevention</i> [online]. 26(1), pp. 132–140.
Alkema, S	2025	Master's thesis – qualitative data via interviews	60 semi-structured interviews on random people on street, transcribed and analysed using coding types	Non users see the helmet requirement as positive safety measure, hygiene concerns on shared helmets, 23% felt discouraged from using, no one stated they would refuse helmet	Informed consent, anonymity given, social desirability bias acknowledged	Small sample size – 17 users of shared scooters and 43 non-users Focus on a singular safety requirement of helmets Law promotes safety but introduces 'friction'	Alkema, S. (2025) <i>Perceptions of Policy Change How Users and Non-Users of Shared E-Scooters Experience the Helmet Requirement in Utrecht and The Hague. PhD, University of Hasselt</i>
Armstrong, M, Garbutt, J	2025	Research is a follow up evaluation	Large scale surveys, qualitative interviews and	61-69% had never used e-bike and 77-84% had never	Formal ethical consent given by	Broader look at overall health and transport impact	Armstrong, M., Garbutt, J., Jones, T., Spencer, B.,

and others		of the introduction of e-bikes and e-scooter share hire schemes	triangulated via geographic expansion	used an e-scooter, e-bikes users used their owned and e-scooter users mostly hired them, resistance to using rental schemes, more support for e-bikes than e-scooters	University of Bristol Ethics Committee and GDPR complied with	of schemes in the UK Is usage actually that high? May need further supporting research	Philips, I., Sanghera, S., Welch, L., Roberts, R., De Vocht, F., Jago, R. and Salway, R. (2025) <i>Helmet (Health Impact of E-bikes and E-scooters) Study: Data Collection Methods and Information Gathered For the Evaluation of the Introduction of Share-hire Schemes. National Institute For Health and Care Research</i> [online]. 5 (44) [Accessed 20 December 2025].
Travers and others	2022	Mixed method scoping review	Database searches, Google Scholar review, and logging the data to geographical areas	Found that younger more tech savvy demographic using e-vehicles, low income and marginalized communities have less access, lack of safe infrastructure (bike lanes), regulatory	No human participants for ethical consent but all data taken from appropriate resources.	Looked at more than just e-bikes and e-scooters and didn't conduct new research themselves	Travers, R., Bigazzi, A., Branion-Calles, M., Fischer, J., Giles, A., Nelson, T., Reifferscheid, L. and Winters, M. (2022) <i>Transportation Planning, Policy, and Electric</i>

				confusion where things can be ridden, permanent infrastructure must be committed to.			<i>Micro-Mobilities: A Knowledge Synthesis of Recent Publications.</i> Burnaby: Simon Fraser University. Available at: https://summit.sfu.ca/item/31897 (Accessed: 11 January 2026).
Khalemsky, Gelbard and Sher	2023	2 part analytical quantitative research	Accident records analysed to see increasing frequency and severity of accidents involving e-bikes and e-scooters (127,627 records of accidents from 2018-2021)	Disproportionate risk – severe accidents occurring at rates which don't match proportion on road, growing trend of accidents, lack of safety equipment (helmets) is an issue	No mention of ethical consent but states where data is from which is a database provided directly from Israel Police, does not list individual identifiers	Working paper – not peer reviewed 2021 is quite up to date but could do with some newer analysis to match growing trend identified Matches the gov.uk data	Khalemsky, A., Gelbard, R. and Sher, M. (2023) <i>Analysis of e-bikes and e-scooters accidents using classification clustering approach.</i> SSRN Electronic Journal. [Online] Available at: https://ssrn.com/abstract=4405629 [Accessed: 11 January 2026].
Pizzani, Cameli, Lantieri, Vignali,	2022	Empirical research in Trondheim	Speed tracker on 204 e-scooters and hidden observers	Most riders stayed well below the maximum legal limit (speeding less common	Informed consent difficult to achieve	Different methods of research to other research so far	Pazzini, M., Cameli, L., Lantieri, C., Vignali, V., Dondi, G. and Jonsson, T.

Dondi and Jonsson		m, Norway		than public perception thinks), under 35s, shared rental scooters mostly observed, most used cycle paths when available	due to empirical research but no photos or videos of riders and no personal ID info collected	Don't assist with evidence of private owned e-scooters as most were rental	(2022) 'New Micromobility Means of Transport: An Analysis of E-Scooter Users' Behaviour in Trondheim', <i>International Journal of Environmental Research and Public Health</i> , 19(12), 7374. Available at: https://doi.org/10.3390/ijerph19127374 (Accessed: 11 January 2026).
Geo, Wang, Zhang and Chen	2025	Trajectory analysis on speed, time, acceleration and change in angles over course of trip	Trajectory data collected over 11 days in Nov 2023 in Sweden. Explore single and tandem e-scooter riding	Found that fluctuations in acceleration and turning patterns were indicators of tandem riding, likely due to added weight, suggest this model should be utilised to detect tandem riding, locate when unsafe riding more frequent	Data was anonymized with no personal data collected only trajectory, consent given when riders accept terms and conditions on apps	Looks a specific issue of e-scooters relating to a specific safety issue, accuracy of 92% Further supports the data on the increase in injuries	Zhao, J., Wu, J., Jiang, S., Li, Z. and Liu, P. (2025) LSTM-based Classification of E-scooter Trajectory Features For Single Vs Tandem Riding Detection. <i>Traffic Injury Prevention</i> [online]. 1 (10) [Accessed 11 January 2026].

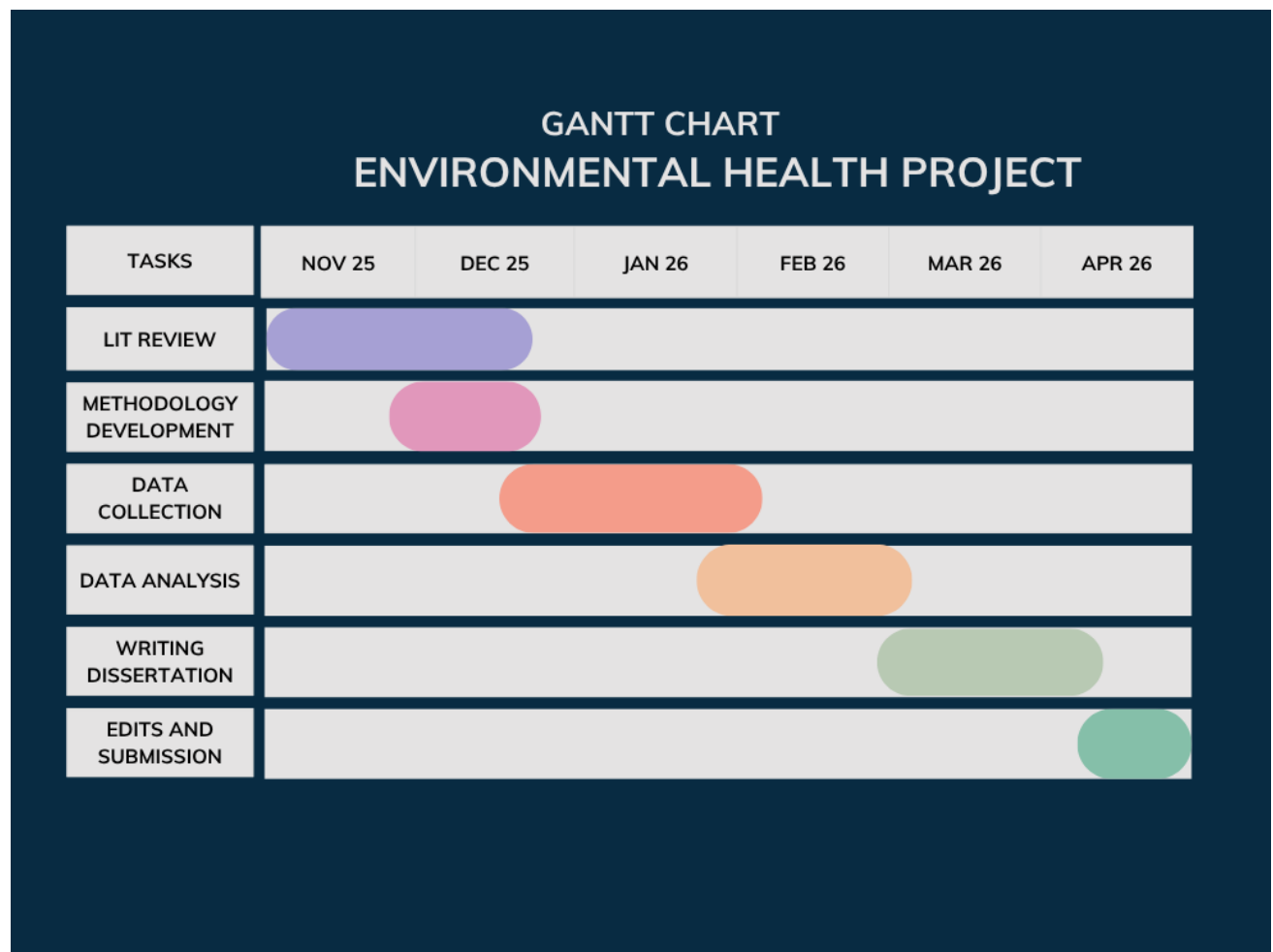
De Blacam and Keating	2025	Clinical review of 4 cases	Case studies of 4 children who had facial surgery following accidents on e-bikes	Severe facial abrasions and lacerations to all 4, dental injuries to 2 and prolonged recovery time, not wearing helmets, accidents on main roads or footpaths, 16 or under (illegal in Ireland)	No identifying markers, written informed consent and GDPR	Highlights 'toy' misconception, stricter enforcement suggested, severe risks to children	De Blacam, C. and Keating, M. (2025) Electric-scooter-related Facial Injuries in Children: A Christmas Case Series. <i>Irish Medical Journal</i> [online]. 118 (8), pp. 132-138. [Accessed 11 January 2026].
Mwambeleko	2022	Master's thesis – analysis of crash data	Analyzed 463 crashes involving e-scooters and e-bikes in Florida between 2018 and 2022	e-scooters – riders are vulnerable at intersections, e-bikes – crashes more likely on roads (parallel to cars)	Appears ethical due to analysis conducted, masters thesis so reviewed by University Review Board	Infrastructure improvements needed and better policy and education for both drivers of cars and e-vehicle users	Mwambeleko, E. (2022) <i>Analysis of Shared Micromobility Related Crashes: Case Study of Florida</i> [online]. MSCE, University of North Florida. Available from: https://digitalcommons.unf.edu/etd/1164/ [Accessed 11 th January 2026].
International Transport Forum - Athens	2024	Technical Report	Updated analysis on previous report in 2020 to provide	Number of injuries is rising as e-vehicle use increases, danger relating	No ethical issues identified.	Report details a recommendation for a 'safe system' approach – moving away from	International Transport Forum (2024) <i>Safer Micromobility</i>

			recommendations	to people using shared scooters is decreasing as people become more savvy, collisions with cars are over 80% of fatalities for cyclists and e-scooter riders		blaming user and focus on a system that accounts for human error, again a note to say that cities should prepare for more routes for these vehicles, rules in Athens are different to UK rules, no data on private scooter users	: <i>Technical Report</i> . Paris: OECD Publishing. Available at: https://www.itf-oecd.org/sites/default/files/safer-micromobility-technical-report.pdf (Accessed: 12 January 2026).
Hang, Trinh and Nguyen	2023	Surveys and applications to psychological models	Survey of 594 school e-bike riders + analysed decisions they made with Theory of Planned Behaviour, Prototype Willingness Model and Integrative Model (combines both)	Aggressive riding occurred as a 'social reactive' process, peer pressure and willingness to engage in risky behaviour on bikess	Study approved, and informed consent given	Stricter enforcement, better engineering	Hang, K.T., Trinh, T.A. and Nguyen, T.P.L. (2023) Examining the determinants of electric bike riders' attitudes towards traffic safety and risky driving behaviours amongst high-school students in Vietnam. <i>Transportation Research Interdisciplinary Perspectives</i> [online]. 20, p. 100827. Available from: https://www.sciencedirect.com/science/article/pii/S2

							590198223001367 [Accessed 12 January 2026].
Melia and Bartle	2021	Mixed methods analysis	Survey of 2000 participants	e-bikes have potential for decarbonization due to increased usage, e-bike can handle hill terrain, assist with health or physical constraints, separated cycling infrastructures are good	Complies with ethical standards	Recommendations – focus on hostile road conditions, target commuters and promote e-bikes for work travel, use subsidies to attract people	Melia, S. and Bartle, I. (2022) Who uses e-bikes in the UK and why? <i>International Journal of Sustainable Transportation</i> [online]. 16 (7), pp. 618–629. Available from: https://www.tandfonline.com/doi/full/10.1080/15568318.2021.1956027 [Accessed 12 January 2026].
Burt and Ahmed	2023	Mixed Method research	A systematic review of international literature and a targeted survey of residents in West Midlands relating to public perception and user behaviour of e-bikes	Risk behaviours – pavement riding, substance use, no safety gear and tandem riding Public perception – e-bikes are sustainable for environment but safety concerns offset these +ves	Study had ethical approval for University of Birmingham	UK specific studies have focused on injuries, international data is wider	Burt, N. and Ahmed, Z. (2023) E-scooter attitudes and risk-taking behaviours: an international systematic literature review and survey responses in the West Midlands, United Kingdom.

				Infrastrucrture needs improving – when separate lanes, people happier			<i>Frontiers in Public Health</i> [online]. 11, 1277378. Available from: https://doi.org/10.3389/fpubh.2023.1277378 [Accessed 18 January 2026].
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7.3 Appendix C – Gantt Chart



7.4 Appendix D – Corrective Feedback Images from the Adolescent Questionnaire

Question 1

Section 5 of 10

Just so you know!

You can ride privately owned e-scooters only on private land with permission from the owner. Therefore, only your own garden and a friend's garden with their permission! You are not legally allowed to use your own e-scooter on pavements, roads or in public spaces like parks!

Question 2

Section 7 of 10

Just so you know!

The correct answer is 15.5mph (miles per hour).

Question 3

Section 9 of 10

Just so you know!

You can be awarded between 6-8 points and these can stay on your provisional licence and move across to your full driving licence for 4 years!

7.5 Appendix E – Code of Ethics Form



University of the
West of England

APPLICATION FOR ETHICAL REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS

This application form should be completed by members of staff and PhD/ Prof Doc students undertaking research which involves human participants. Undergraduate and Masters level students are required to complete this application form where their project has been referred for review by a supervisor to a Faculty Research Ethics Committee (FREC) in accordance with the policy at

<http://www1.uwe.ac.uk/research/researchethics>. For research using human tissue, please see separate policy, procedures and guidance linked from

<http://www1.uwe.ac.uk/research/researchethics/policyandprocedures.aspx>

Please note that the process takes **up to six weeks** from receipt of a valid application. **The research should not commence until written approval has been received from the University Research Ethics Committee (UREC) or Faculty Research Ethics Committee (FREC).** You should bear this in mind when setting a start date for the project.

APPLICANT DETAILS

Name of Applicant*	Alexandra Winter		
Faculty		Department	Public and Environmental Health
Status: Staff/PG Student/ MSc Student/ Undergraduate	Level 6 Student	Email address	WS372013@weston.ac.uk
Contact postal address	89 Hathaway Road, Swindon, SN2 7TY		
Name of co-researchers* (where applicable)	N/A		

*This form must include the name of the UWE Project Manager (normally the budget holder and PI)

FOR STUDENT APPLICANTS ONLY

Name of Supervisor/Director of Studies	Minakshi Bhattacharjee		
Detail of course/degree for which research is being undertaken	Environmental Health Practitioner		
Supervisor's/Director of Studies' email address	minakshi.b@weston.ac.uk		
Supervisor's/ Director of Studies' comments	<i>Please note the supervisor must add comments here. Failure to do so will result in the application being returned.</i>		
For student applications, supervisors should ensure that all of the following are satisfied before the study begins: • The topic merits further research; • The student has the skills to carry out the research; • The participant information sheet is appropriate; • The procedures for recruitment of research participants and obtained informed consent are appropriate.			

PROJECT DETAILS

Project title	Highlighting the gaps in effectiveness of the safety information provided to students aged 16-19 on the risks of e-bikes and e-scooters: How do the public and safety stakeholders perceive the awareness and provision of current e-scooter and e-bike guidance?		
Is this project externally funded?	No		
If externally funded please give PASS reference	N/A		
Proposed start date for the research	Nov/Dec 25	Anticipated project end date	April 2026

Fieldwork should not begin until ethics approval has been given

DETAILS OF THE PROPOSED WORK

1. Aims, objectives of and background to the research

This should provide the reviewer of the application with sufficient detail to allow them to understand the nature of the project and its rationale, and the ethical context, in terms which are clear to a lay reader. Do not assume that the reader knows you or your area of work. You may provide a copy of your research proposal in addition to completing this section. Please try to keep within 500 words.

Answer here:

This research project seeks to answer whether the current safety information and legislation available regarding e-scooters and e-bikes is clear and understood, specifically by ages 16+.

Objectives:

- Do students in colleges understand the safety rules and legislation on e-bikes and e-scooters relating to speeds, legal ages and battery charging?
- Examine the current safety information available on e-bikes and e-scooters and explore its accessibility to those aged 16+.
- Do safety stakeholders feel that the information relating to rules around e-bikes and e-scooters are clear and accessible to the wider public?
- Provide recommendations on how safety regulators and institutions can improve the information provided to under 21s on safety around e-bikes and e-scooters.

2. Research methodology to be used

You should explain how you plan to undertake your research. A copy of the interview schedule/questionnaire/observation schedule/focus group topic guide should be attached where applicable.

Answer here:

The research method will be a mixed method pragmatist approach utilising the following:

- A quantitative questionnaire provided to London colleges for 16+ students to complete
- A mixed method questionnaire to officers at the London Fire Brigade
- A review of policy documents

The responses to these questionnaires will be utilised to see if there is indeed a gap between how the safety stakeholders agree that the rules and regulations are perceived and how much 16+ students understand these rules and regulations. In order to ensure a reliable and high response rate, it is important that these questionnaires are not too long in length (Kost, 2018).

The data will be collected via an online survey tool and then analysed using several methods:

- The qualitative data will be analysed via thematic analysis and then triangulated to confirm the overall themes and responses
- The quantitative data will be analysed via descriptive and inferential statistics (T-test to show relationships between variables)

3. SELECTION OF PARTICIPANTS

You must indicate if any of the participants in your sample group are in the categories listed. Research involving adult participants who might not have the capacity to consent or who fall under the Mental Capacity Act must be reviewed either by an NHS Research Ethics Committee or the [National Social Care Research Ethics Committee](#).

If your proposed research involves contact with children or vulnerable adults, or others of the specified categories below, you may need to hold a valid DBS check. Evidence of a DBS check should take the form of an email from the relevant counter signatory confirming the researcher has a valid DBS check for working with children and/or vulnerable adults. It is the responsibility of the applicant to provide this confirmation.

Members of staff requiring DBS checks should contact Human Resources hr@uwe.ac.uk. DBS checks for students are usually organised through the student's faculty, but students in faculties without a DBS counter signatory should contact Leigh Taylor (Leigh.Taylor@uwe.ac.uk).

Answer here:

16+ (capping at 19yr olds) in London Colleges – the questionnaire is sent from the college rather than myself (I will have no contact with the 16+ students other than reviewing the questionnaire responses which only specify age and nothing else)

London Fire Bridge – adults (likely more direct contact via email)

Will the participants be from any of the following groups? ('x' as appropriate)

- ☒ Children under 18*
- ☐ Adults who are unable to consent for themselves
- ☐ Adults who are unconscious, very severely ill or have a terminal illness
- ☐ Adults in emergency situations
- ☐ Adults with mental illness (particularly if detained under Mental Health Legislation)
- ☐ Prisoners
- ☐ Young Offenders
- ☐ Healthy Volunteers (where procedures may be adverse or invasive)
- ☐ Those who could be considered to have a particularly dependent relationship with the investigator, e.g. those in care homes, medical students
- ☐ Other vulnerable groups
- ☐ None of the above

** If you are researching with children please provide details of completed relevant safeguarding training.*

If any of the above applies, please justify their inclusion in this research.

SEE ABOVE – assessing views of 16+ students in relation to my research question

4. Please explain how you will determine your sample size/recruitment strategy, and identify, approach and recruit your participants. Please explain arrangements made for participants who may not adequately understand verbal explanations or written information in English

In this section, you should explain the rationale for your sample size and describe how you will identify and approach potential participants and recruit them to your study.

Answer here:

Will be contacting all London Colleges via a list collected online and contacting their administration to ask if the link to the questionnaire can be shared. There will be a similar process for the London Fire Brigade.

The sample size will be around 380 responses for the colleges – a population size of around 1 million, confidence level of 95% and margin of error 5%.

The same size will be around 360 for the London Fire Brigade - a population size of around 5,800, confidence level of 95% and margin of error 5%.

Calculated using an online tool from Survey Monkey - <https://uk.surveymonkey.com/mp/sample-size-calculator/>

5. What are your arrangements for obtaining informed consent whether written, verbal or other? (where applicable, copies of participant information sheets and consent forms should be provided)

Informed consent is an ethical requirement of most research. Applicants should demonstrate that they are conversant with and have given due consideration to the need for informed consent and that any consent forms prepared for the study ensure that potential research participants are given sufficient information about a study, in a format they understand, to enable them to exercise their right to make an informed decision whether or not to participate in a research study.

You should describe how you will obtain informed consent from the participants and, where this is written consent, include copies of participant information sheets and consent forms. Where other forms of consent are obtained (eg verbal, recorded) you should explain the processes you intend to use. If you do not intend to seek consent or are using covert methods, you need to explain and justify your approach. Please consider carefully whether or not you need to seek consent for archiving or re-use of data.

Answer here:

I will provide all colleges and the London Fire Brigade with participant information forms to share along with the questionnaire link. A consent form for the college and London Fire Brigade administration team to complete. Additionally the first part of the questionnaire will be a question explaining the process and confirming consent, if consent is not given then no further details will be collected.

6. What arrangements are in place for participants to withdraw from the study?

Consent must be freely given with sufficient detail to indicate what participating in the study will involve and how they may withdraw. There should be no penalty for withdrawing and the participant is not required to provide any reason.

Please note: allowing participants to withdraw at any time could prejudice your ability to complete your research. It may be appropriate to set a fixed final withdrawal date.

Answer here:

Participant forms and consent forms will detail the right to withdraw at any time.

7. If the research generates personal data, please describe the arrangements for maintaining anonymity and confidentiality (or the reasons for not doing so)

You should explain what measures you plan to take to ensure that the information provided by research participants is anonymised/pseudonymised (where appropriate) and how it will be kept confidential. In the event that the data are not to be anonymised/pseudonymised, please provide a justification.

Personal data is defined as 'personal information about a living person which is being, or which will be processed as part of a relevant filing system. This personal information includes for example, opinions, photographs and voice recordings' (UWE Data Protection Act 1998, Guidance for Employees).

Answer here:

All data is anonymized, the only specific question will detail age range for the students, and this is to ensure that no-one 20+ answers the questionnaire. It will be kept confidential via the questionnaire link and then the data itself will be deleted 3 months after submission date to ensure that if any amendments are made to my dissertation post submission, I still have the data.

8. Please describe how you will store data collected in the course of your research and maintain data Security and protection.

Describe how you will store the data, who will have access to it, and what happens to it at the end of the project, including any arrangements for long-term storage of data and potential re-use. If your research is externally funded, the research sponsors may have specific requirements for retention of records. You should consult the terms and conditions of grant awards for details.

It may be appropriate for the research data to be offered to a data archive for re-use. If this is the case, it is important that consent for this is included in the participant consent form.

UWE IT Services provides data protection and encryption facilities - see http://www.uwe.ac.uk/its-staff/corporate/ourpolicies/intranet/encryption_facilities_provided_by_uwe_itservices.shtml

Answer here:

See above. Additionally access to the questionnaire results and dissertation will only be available via my work laptop which is encrypted and password protected.

9. What risks (eg physical, psychological, social, legal or economic), if any, do the participants face in taking part in this research and how will you Address these risks?

Describe ethical issues related to the physical, psychological and emotional wellbeing of the participants, and what you will do to protect their wellbeing. If you do not envisage there being any risks to the participants, please make it clear that you have considered the possibility and justify your approach.

Answer here:

NONE

10. Are there any potential risks to researchers and any other people impacted by this study as a consequence of undertaking this Research that are greater than those encountered in normal day to day life?

Describe any health and safety issues including risks and dangers for both the participants and yourself (if appropriate) and what you will do about them. This might include, for instance, arrangements to ensure that a supervisor or co-researcher has details of your whereabouts and a means of contacting you when

you conduct interviews away from your base; or ensuring that a 'chaperone' is available if necessary for one-to-one interviews.

Please check to confirm you have carried out a risk assessment for your research ☐

Answer here:

NONE

11. How will the results of the research be reported and disseminated?

Please indicate in which forms and formats the results of the research will be communicated.

(Select all that apply)

- ☒ Peer reviewed journal
- ☐ Conference presentation
- ☐ Internal report
- ☒ Dissertation/Thesis
- ☒ Other publication
- ☐ Written feedback to research participants
- ☐ Presentation to participants or relevant community groups
- ☐ Digital Media
- ☐ Other (Please specify below)

12. WILL YOUR RESEARCH BE TAKING PLACE OVERSEAS?

If you intend to undertake research overseas, please provide details of additional issues which this may raise, and describe how you will address these. Eg language, culture, legal framework, insurance, data protection, political climate, health and safety. Please also clarify whether or not ethics approval will be sought locally in another country.

Answer here:

N/A

13. Are there any other ethical issues that have not been addressed which you would wish to bring to the attention of the Faculty and/or University Research Ethics Committee?

This gives the researcher the opportunity to raise any other ethical issues considered in planning the research or which the researcher feels need raising with the Committee.

Answer here:

N/A

CHECKLIST

Please complete before submitting the form

Please note: supporting documentation should include version numbers and dates

	Yes/No
Is a copy of the research proposal attached?	Yes
Have you explained how you will select the participants?	Yes
Is a participant information sheet attached?	Yes
Is a participant consent form attached?	Yes

Is a copy of your questionnaire/topic guide attached?	Yes
Have you described the ethical issues related to the well-being of participants?	Yes
Have you described fully how you will maintain confidentiality?	Yes
Have you included details of data protection including data storage?	Yes
Where applicable, is evidence of a current DBS (formerly CRB) check attached?	N/A
Is a Risk Assessment form attached? (HAS only)	N/A
Have you considered health and safety issues for the participants and researchers?	Yes

DECLARATION

The information contained in this application, including any accompanying information, is to the best of my knowledge, complete and correct. I have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my obligations and the right of the participants.

Principal Investigator name	Alexandra Winter
Signature	
Date	23/10/2025

Supervisor or module leader name (where appropriate)	
Signature	
Date	

The signed form should be submitted electronically to Committee Services: researchethics@uwe.ac.uk and email copied to the Supervisor/Director of Studies where applicable together with all supporting documentation (research proposal, participant information sheet, consent form etc).

For student applications where an electronic signature is not available from the Supervisor we will require an email from the Supervisor confirming support.

Please provide all the information requested and justify where appropriate.

For further guidance, please see <http://www1.uwe.ac.uk/research/researchethics> (applicants' information)

7.6 Appendix F – Information Sheets and Consent Forms

Participant Information form for Adolescents



University of the
West of England

Participant Information Sheet

General Information

You are invited to take part in research taking place at the University of the West of England, Bristol. Before you decide whether to take part, it is important for you to understand why the study is being done and what it will involve. Please read the following information carefully and if you have any queries or would like more information please contact the Alexandra Winter on WS372013@weston.ac.uk.

What is the aim of the research?

The research is looking at whether the rules and regulations on e-bikes and e-scooters are clear enough to be understood by all. The research aims to provide recommendations on how to improve the quality and reach of information currently given on e-bikes and e-scooters. To help us answer these questions we will be conducting quantitative and qualitative questionnaires to different parties. The aim of the questionnaires will be to collect information that will be made anonymous.

The results of our study will be analysed and used within a student dissertation final year project. The anonymised results may also be used in conference papers and peer-reviewed academic papers.

Why have I been invited to take part?

As a 16- 19-year-old, we are interested in gaining information about your understanding of the subject posed above so the questionnaire will ask you about these things. We will not be asking any questions which would identify you personally. The purpose of the questions will be to gain your knowledge on this subject and your views.

Do I have to take part?

No you do not have to take part, taking part in this research is completely voluntary and you can withdraw your consent at any time. If you do decide to take part, then you can keep this information sheet, and the questionnaire will confirm your consent before the questions are asked. The information collected is anonymous and therefore cannot be traced back to you at any point in time. Deciding not to take part does not have a penalty.

What will happen to me if I take part and what do I have to do?

If you agree to take part then you need to follow the link to the questionnaire and answer the questions, the questionnaire should take you no longer than 5 minutes to complete. Your answers will be fully anonymised.

What are the benefits of taking part?

In all honesty you will be helping a student complete a part of their final year project. You will also be able to shape the recommendation suggested within the dissertation and these could lead to influence measures taken to improve the information provided to students in college on the risks and rules on e-bikes and e-scooters.

What are the possible risks of taking part?

We do not foresee or anticipate any significant risk to you in taking part in this study. If you feel uncomfortable at any time, you can simply close the questionnaire and not complete it further. The questionnaire has been designed with these considerations in mind.

What will happen to your information?

All the information we receive via the questionnaire link is fully anonymised and can not be traced back to you. The raw data collected will be stored on an encrypted device and deleted 3 months after April 2026.

Who has ethically approved this research?

The project has been reviewed and approved by the University of the West of England University Research Ethics Committee. Any comments, questions or complaints about the ethical conduct of this study can be addressed to the Research Ethics Committee at the University of the West of England at:

Researchethics@uwe.ac.uk

What if I have more questions or do not understand something?

If you would like any further information about the research please contact in the first instance:

Alexandra Winter – WS372013@weston.ac.uk

Thank you for agreeing to take part in this study.

You can keep this copy of this Participant Information Sheet.

Participant Information Sheet for Safety Stakeholders



University of the
West of England

Participant Information Sheet

General Information

You are invited to take part in research taking place at the University of the West of England, Bristol. Before you decide whether to take part, it is important for you to understand why the study is being done and what it will involve. Please read the following information carefully and if you have any queries or would like more information please contact the Alexandra Winter on WS372013@weston.ac.uk.

What is the aim of the research?

The research is looking at whether the rules and regulations on e-bikes and e-scooters are clear enough to be understood by all. The research aims to provide recommendations on how to improve the quality and reach of information currently given on e-bikes and e-scooters. To help us answer these questions we will be conducting quantitative and qualitative questionnaires to different parties. The aim of the questionnaires will be to collect information that will be made anonymous.

The results of our study will be analysed and used within a student dissertation final year project. The anonymised results may also be used in conference papers and peer-reviewed academic papers.

Why have I been invited to take part?

As an related safety stakeholder, we are interested in gaining information about your understanding of the subject posed above so the questionnaire will ask you about these things. We will not be asking any questions which would identify you personally. The purpose of the questions will be to gain your knowledge on this subject and your views.

Do I have to take part?

No you do not have to take part, taking part in this research is completely voluntary and you can withdraw your consent at any time. If you do decide to take part, then you can keep this information sheet, and the questionnaire will confirm your consent before the questions are asked. The information collected is anonymous and therefore cannot be traced back to you at any point in time. Deciding not to take part does not have a penalty.

What will happen to me if I take part and what do I have to do?

If you agree to take part then you need to follow the link to the questionnaire and answer the questions, the questionnaire should take you no longer than 15 minutes to complete. Your answers will be fully anonymised.

What are the benefits of taking part?

In all honesty you will helping a student complete a part of their final year project. You will also be able to shape the recommendation suggested within the dissertation and these could lead to influence measures taken to improve the information provided to students in college on the risks and rules on e-bikes and e-scooters.

What are the possible risks of taking part?

We do not foresee or anticipate any significant risk to you in taking part in this study. If you feel uncomfortable at any time, you can simply close the questionnaire and not complete it further. The questionnaire has been designed with these considerations in mind.

What will happen to your information?

All the information we receive via the questionnaire link is fully anonymised and cannot be traced back to you. The raw data collected will be stored on an encrypted device and deleted 3 months after April 2026.

Who has ethically approved this research?

The project has been reviewed and approved by the University of the West of England University Research Ethics Committee Any comments, questions or complaints about the ethical conduct of this study can be addressed to the Research Ethics Committee at the University of the West of England at:

Researchethics@uwe.ac.uk

What if I have more questions or do not understand something?

If you would like any further information about the research, please contact in the first instance:

Alexandra Winter – WS372013@weston.ac.uk

Thank you for agreeing to take part in this study.

You can keep this copy of this Participant Information Sheet.

Consent Form for Participants

CONSENT FORM FOR PARTICIPANTS

Project Title:

Effectiveness of Safety Information on E-Bikes and E-Scooters: Perceptions of Students Aged 16-19 and Safety Stakeholders

This consent form will have been given to you with a Participant Information Sheet. Please ensure you have read and understood the information contains in the Participant Information Sheet and asked any questions before you sign this form. If you have any

questions, please contact Alexandra Winter who details are set out on the Participant Information Sheet.

If you are happy to allow the institution take part in this short questionnaire, please sign and date this form.

- We (the institution) have read and understood the information in the Participant Information Sheet which I have been given to read before asked to sign this form;
- We (the institution) have read and understood the Data Protection Privacy Notice has been provided to me
- We (the institution) have been given the opportunity to ask questions about the study;
- We (the institution) have had my questions answered satisfactorily by Alexandra Winter (the researcher);
- We (the institution) agree that anonymised quotes may be used in the final Report of this study;
- We (the institution) understand that our participation is voluntary and that we are free to withdraw at any time until the data has been anonymised, without giving a reason;
- We (the institution) agree to take part in the research

Name (on behalf of the institution) (Printed)

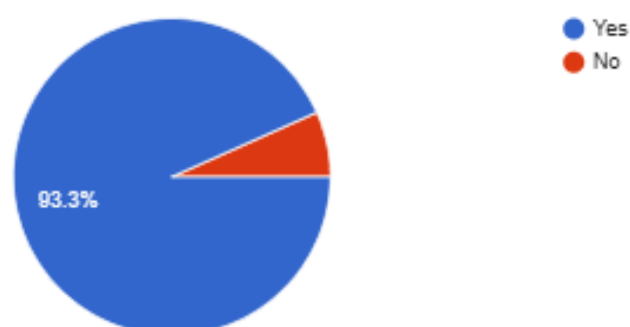
Signature _____ Date _____

7.7 Appendix G – Pilot Questionnaire Questions and Raw Data from Google Forms

The data collected via this questionnaire is anonymised and will be used in a final report by a researcher. The data collected will be deleted 3 months after submission date in April 2026. Please confirm your consent by ticking the 'YES' box below.

 [Copy chart](#)

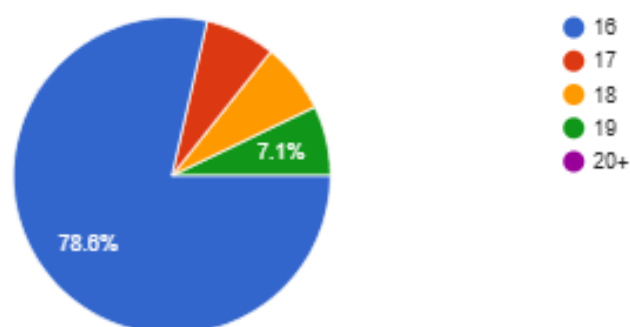
15 responses



Please indicate your age using the choices below:

 [Copy chart](#)

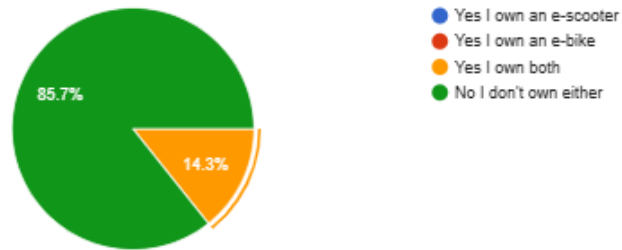
14 responses



Do you own **your own personal** e-scooter or e-bike (select ONLY one)?

[Copy chart](#)

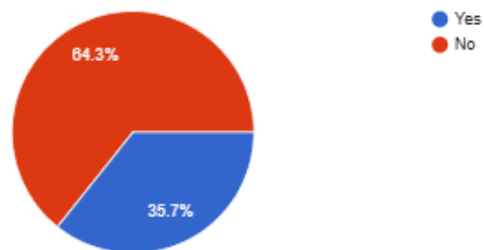
14 responses



Have you ever ridden on a **rented** e-scooter, either rented by yourself or your friends?

[Copy chart](#)

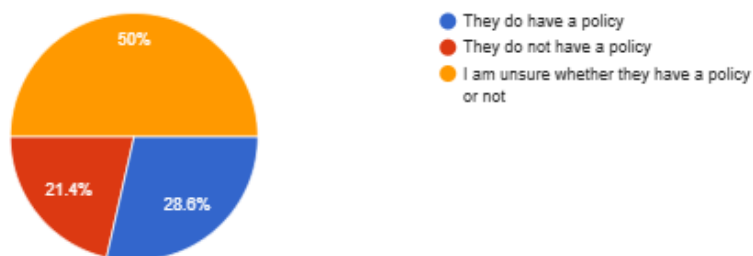
14 responses



Are you aware of whether your college/university has an on-site policy on the use of e-bikes and or/e-scooters?

[Copy chart](#)

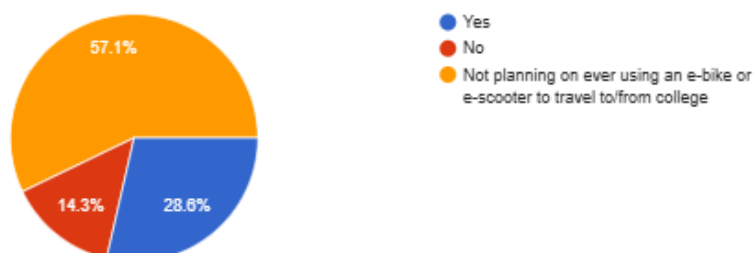
14 responses



Would you seek out the policies on e-bikes or e-scooters before traveling to/from college/university on either an e-bike or an e-scooter?

[Copy chart](#)

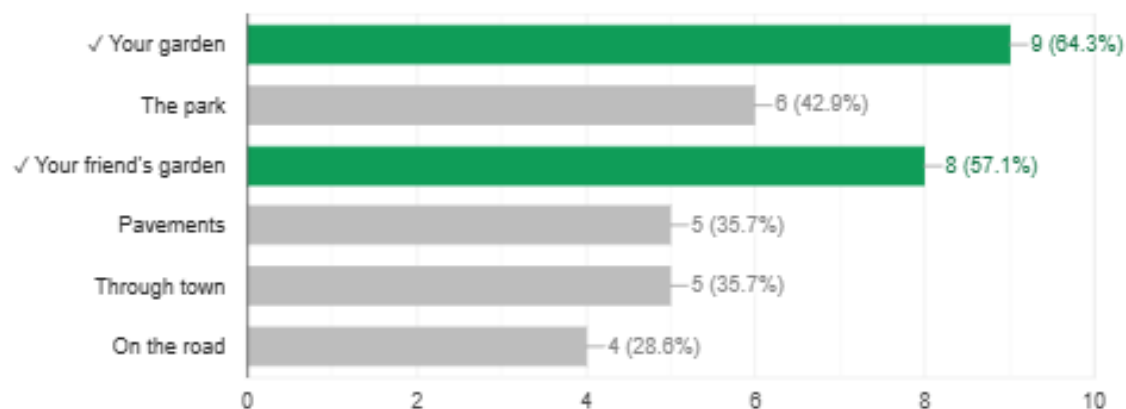
14 responses



The next few questions will be testing your knowledge (it's not a TEST!). You can use your **own e-scooter** in the following places (tick all where you think you can):

[Copy chart](#)

4 / 14 correct responses

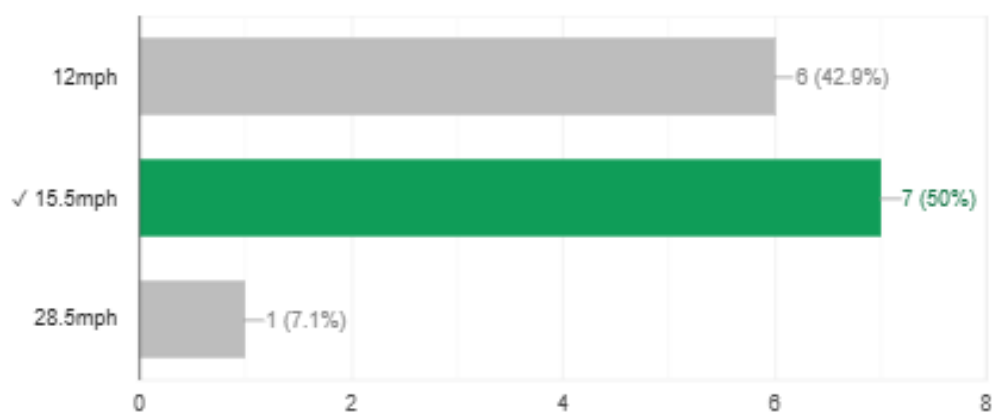


Feedback

How fast can an e-bike go legally in the UK before it is considered a motor vehicle? (in miles per hour)

[Copy chart](#)

7 / 14 correct responses

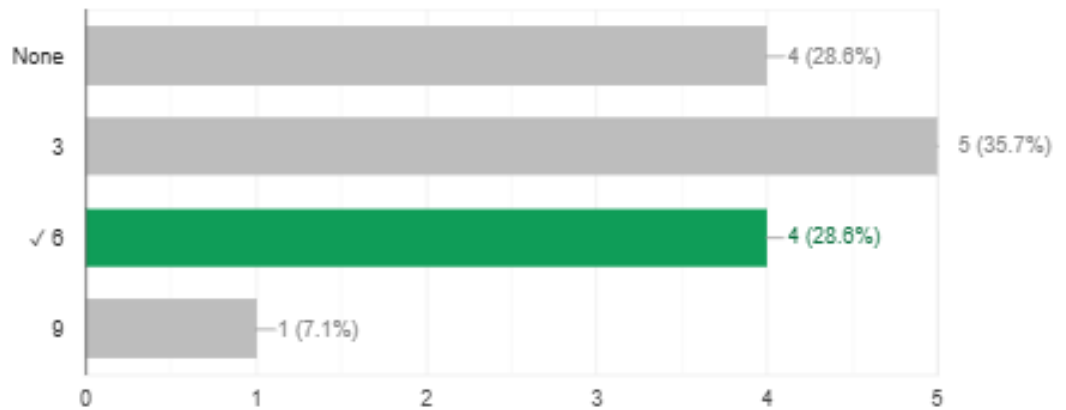


Feedback

How many points can you be awarded on your provisional or full driving licence if you have not purchased insurance when using a **rented** e-scooter?

[Copy chart](#)

4 / 14 correct responses



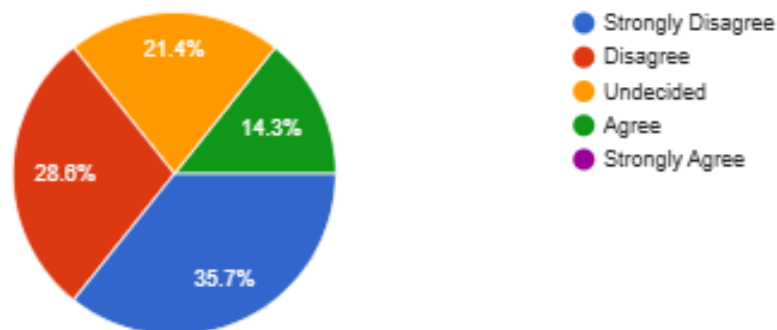
Feedback

Feedback

The rules and regulations regarding the use of e-bikes and e-scooters are common knowledge among the public. (Please rate how much you agree with this statement)

[Copy chart](#)

14 responses



Untitled Section

Please can you provide any feedback in relation to filling this questionnaire in - consider how easy the questions were to understand, how long it took you to complete and any issues you may have had! Thanks!

12 responses

.

W Survey

1 minute

it was fine :)

the questions were very easy to interpret and the questionnaire was very enjoyable

It was fast but I don't live in the uk

Easy to understand, fast to complete. You should make it so that you cannot go back to a previous question once it tells you the answer.

I didn't understand some of the questions

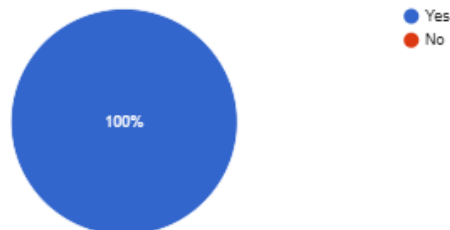
N/A

7.8 Appendix H – Adolescent Questionnaire Questions and Raw Data from Google Forms

The data collected via this questionnaire is anonymised and will be used in a final report by a researcher. The data collected will be deleted 3 months after submission date in April 2026. Please confirm your consent by ticking the 'YES' box below. Untitled Question

 [Copy chart](#)

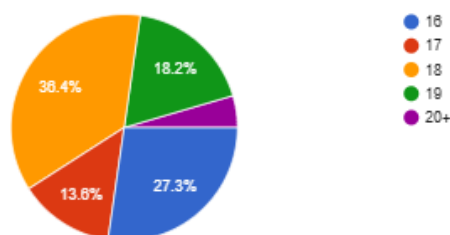
22 responses



Please indicate your age using the choices below:

 [Copy chart](#)

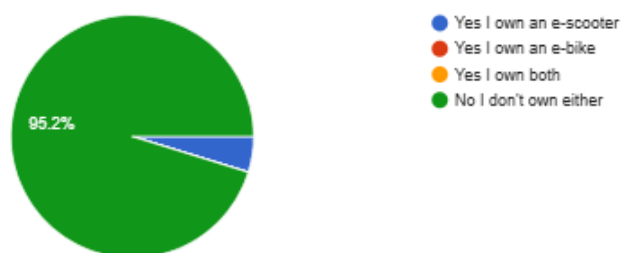
22 responses



Do you own **your own personal** e-scooter or e-bike (select ONLY one)?

 [Copy chart](#)

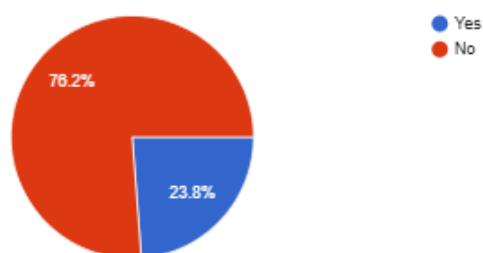
21 responses



Have you ever ridden on a **rented** e-scooter, either rented by yourself or your friends?

 [Copy chart](#)

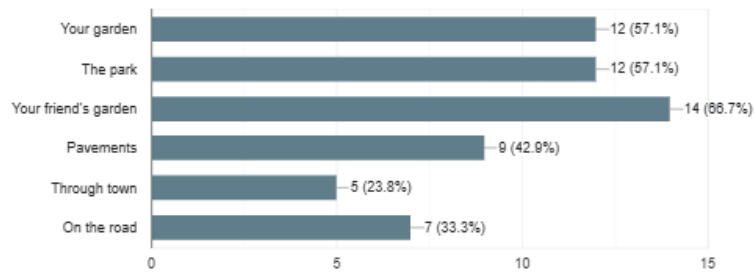
21 responses



Where do you think you can use **your own e-scooter**? (Tick all the places you think you can)

[Copy chart](#)

21 responses

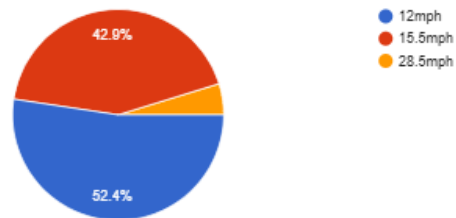


Just so you know!

How fast can an e-bike go legally in the UK before it is considered a motor vehicle? (in miles per hour)

[Copy chart](#)

21 responses

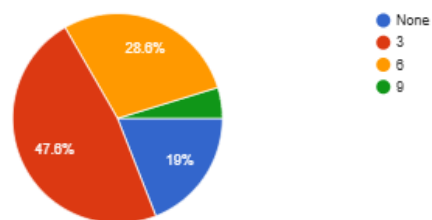


Just so you know!

How many points can you be awarded on your provisional or full driving licence if you have not purchased insurance when using a **rented e-scooter**?

[Copy chart](#)

21 responses

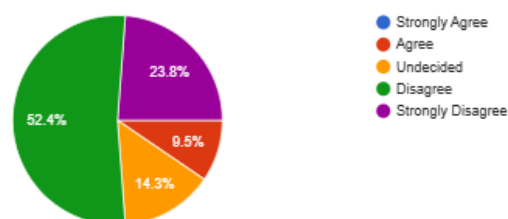


Just so you know!

Please choose one option to show how much you agree with this statement - 'The rules and laws on the use of e-bikes and e-scooters are common knowledge among the public.'

[Copy chart](#)

21 responses



7.9 Appendix I – Safety Stakeholders Questionnaire Questions and Raw Data from Google Forms

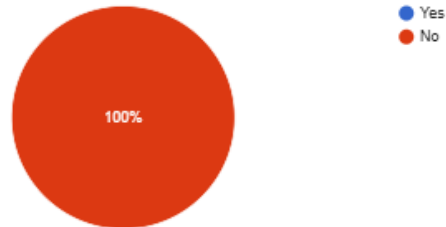
Fire Service



Do you think based upon the increased usage of e-bikes and e-scooter and the occurrences in cases of fires that the public has a good awareness of the charging risks?

[Copy chart](#)

4 responses



Please (in a short summary) explain why you answered how you did for the previous answer.

4 responses

Not enough, but it varies significantly by age group and socio-economic group.

In my experience, knowledge is minimal for most of the public with electrical safety in general. The age group using e bikes/scooters tend to have even less awareness of risk

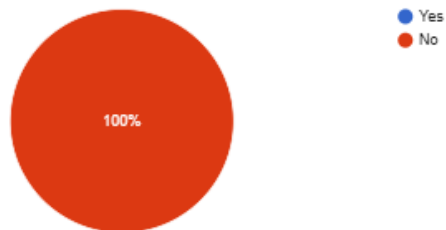
there is still lack of awareness of the risks and also the availability of online unsafe products. There is also an area of use where due to availability of cheap products and conversion options with out the understanding of the risk

I believe there is a need for more in depth public education on lithium-ion battery safety and the potential risks these batteries can pose when not used or stored properly. In particular, more guidance should be provided on the safe charging of e-bikes/e-scooters, along with targeted messaging about the serious fire hazards that can arise when these products are modified or used with non-approved components.

Do you provide training to students in colleges or to colleges (for them to train students themselves) in relation to the risks of e-bikes and e-scooters?

[Copy chart](#)

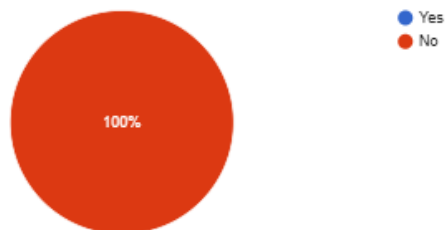
4 responses



Do you think that the information around e-bike and e-scooter rules and regulations has been made easily accessible for users aged 16-19?

[Copy chart](#)

4 responses



If yes, how has this been done? (please include in what formats this information is provided)

0 responses

No responses yet for this question.

If no, how could this be improved?

4 responses

Messaging on platforms young people are actually using, engaging and shocking content, and in person visits from local firefighters or fire investigators, to highlight the dangers of e-bike/e-scooter charging.

There need to be restrictions in buying these from un reputable sources/from abroad. If they could only be purchased in the UK, then the guidance could be given with the item on purchase in a clear format with warning signs - similar to tobacco and so on. Schools and colleges/Uni , plus employers who take on apprentices, need more awareness too, to enable them to deliver information.

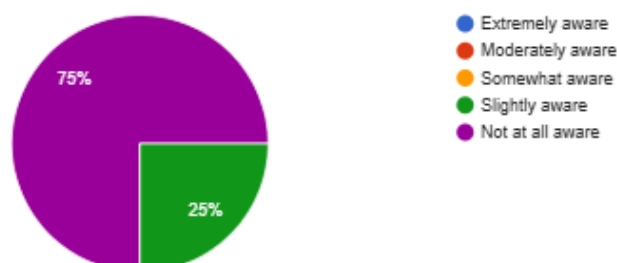
continued engagement and publicity, also rules and advice from suppliers and online restrictions required, we promote this information as best we can but more could be done with the right knowledge and marketing. potentially needs to come from government

I believe this could be strengthened by providing clear, concise and age-appropriate guidance at a Government level, supported by a coordinated multi-agency approach to address the issue effectively.

How aware of the rules and regulations on e-bikes and e-scooters do you think students aged 16-19 are? (Specifically, where e-bikes and e-scooters can be used and what penalties they may face if rules are broken)

 [Copy chart](#)

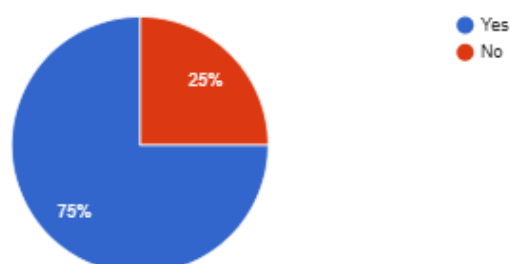
4 responses



Does the Fire Brigade have any authority over on-site policies colleges use in relation to e-bikes and e-scooters?

 [Copy chart](#)

4 responses



Road Safety

The data collected via this questionnaire is anonymised and will be used in a final report by the researcher. The data collected will be deleted 3 months after submission date in April 2026. Please confirm consent by ticking the 'YES' box below.

[Copy chart](#)

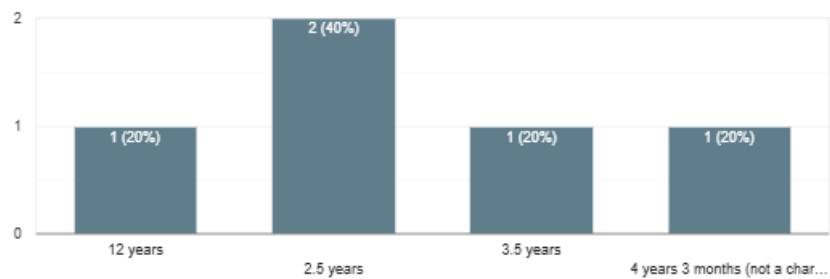
5 responses



How long have you worked at your Road Safety Charity? (Please indicate the months/years in your answer).

[Copy chart](#)

5 responses



How would you rate the severity of the occurrence of e-bike and e-scooter road incidents? (Please indicate only one on the scale)

[Copy chart](#)

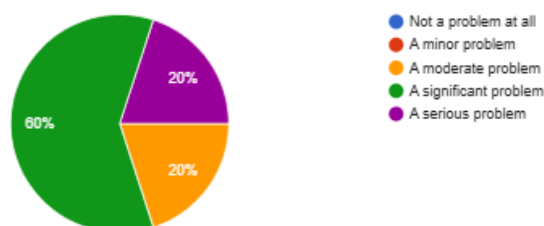
5 responses



How would you rate the severity of e-bike and e-scooter road incidents in relation to the risk of harm?

[Copy chart](#)

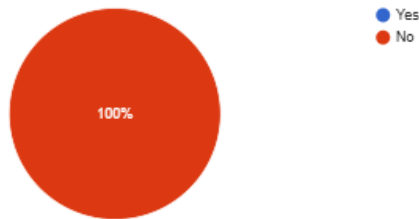
5 responses



Do you think based upon people you have dealt with or spoken to following road incidents relating e-bikes and e-scooters, people in general have a good understanding of the rules related to them?

[Copy chart](#)

5 responses



Please (in a short summary) explain why you answered how you did for the previous question.

5 responses

They dont realise that private e scooters are illegal

The law is fairly clear but the prevalence of rental schemes give the impression the use of all e-scooters on the highways is legal, when it isn't. Poor enforcement only worsens the issue.

People are not aware, or claim to be unaware, that they are illegal, don't have provisional licences, and de-restrict them. They don't understand why Halfords, for example, sells them if illegal

People who use them believe they have the right to use them on roads and pavements, neither of which are legal.

Riders do not see them as any different to that of a bicycle and therefore ride them where they like, under the influence of drink and drugs, whilst using a mobile phone without insurance, a driving licence and other requirements for a motor vehicle as they do not associate an E-scooter as being a motor vehicle

How reliable do you think the current data on e-bike and e-scooter accidents and injuries is, and what improvements could be made to improve them if necessary?

5 responses

Not very, many are not reported

Fairly unreliable. We feel the data available generally under reports the issue

It's not an area I'm looking into currently so haven't looked at data. Answers are based on observation of the area I live in. E-scooters are an issue but not a problem currently.

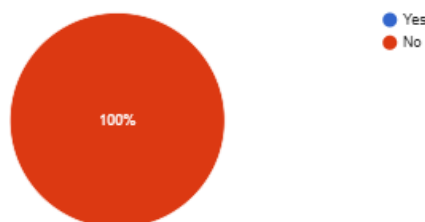
I don't know about current data so am unsure how to improve.

they are not recorded correctly on the STATS 19 (provided by the police and used by Department for Transport to record injury collisions) Riders do not necessarily stop and exchange details, but ride off and self present at hospital. This could be improved by better data sharing information

Do you provide advice on the fire risks associated with lithium-ion batteries, particularly regarding charging risks?

[Copy chart](#)

5 responses



What kind of advice do you provide?

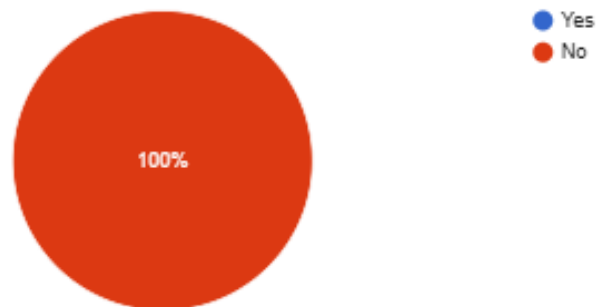
0 responses

No responses yet for this question.

Are you running any public awareness campaigns to educate the public or retailers on the risks relating to e-bikes and e-scooters?

 [Copy chart](#)

5 responses



If yes, can you detail these campaigns briefly?

0 responses

No responses yet for this question.

How aware of the rules and regulations on e-bikes and e-scooters do you think students aged 16-19 are? (Specifically, where e-bikes and e-scooters can be used and what penalties they may face if rules are broken)

 [Copy chart](#)

5 responses

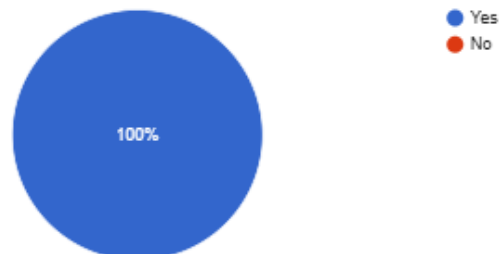


Anti-Social Behaviour

The data collected via this questionnaire is anonymised and will be used in a final report by the researcher. The data collected will be deleted 3 months after submission date in April 2026. Please confirm consent by ticking the 'YES' box below.

 [Copy chart](#)

1 response



How long have you worked in the anti-social behaviour team at your authority? (Please indicate the months/years in your answer).

1 response

0 years

How would you rate the severity of the occurrence of anti-social behaviour related to e-scooter and e-bikes in your area?

 [Copy chart](#)

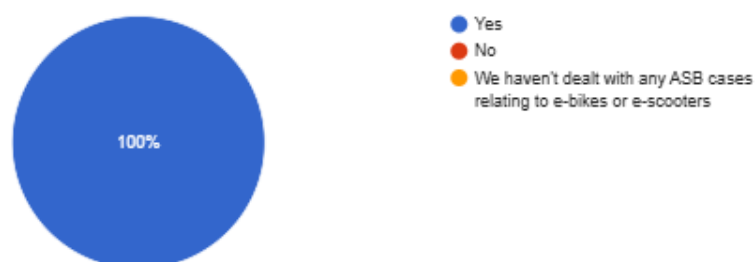
1 response



Do you think based upon any anti-social behaviour relating to e-scooters and e-bikes you have dealt with, people have a good understanding of the rules related to their usage?

 [Copy chart](#)

1 response



Please (in a short summary) explain why you answered how you did for the previous question.

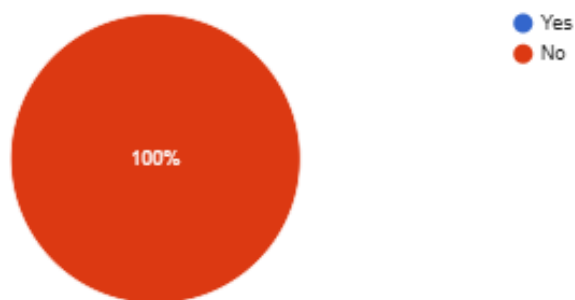
1 response

There are some 10 million ebikes trips per annum in the authority area, including hire schemes. Even accounting for misuse and illegal activity, the vast majority of trips are lawful.

Has your ASB team served any Public Space Protection Orders that address the use of e-bikes and/or e-scooters in particular areas?

 [Copy chart](#)

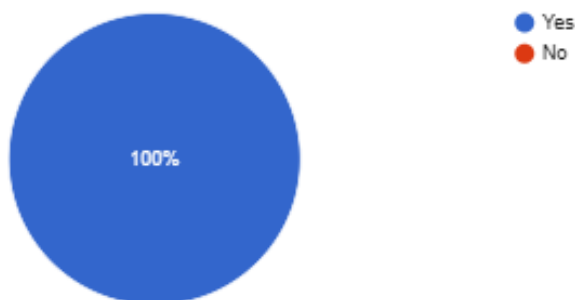
1 response



Are you running any public awareness campaigns in your area to educate the public or retailers on the rules relating to e-bikes and e-scooters?

 [Copy chart](#)

1 response



If yes, can you detail these campaigns briefly?

1 response

Permission to engage with retailers and delivery riders on legal ebike promotion but not evolved as yet

How aware of the rules and regulations on e-bikes and e-scooters do you think students aged 16-19 are? (Specifically, where e-bikes and e-scooters can be used and what penalties they may face if rules are broken)

 [Copy chart](#)

1 response



7.10 Appendix J – Thematic Analysis

4.3 Thematic Analysis

The following 3 steps detail the inductive coding and reflective thematic analysis carried out. The thematic analysis directly supports objective 2,3 and 4.

STEP 1 – Selection of quotations from answers to the following open-ended questions in the safety stakeholder questionnaires:

- ‘Do you think based upon the increased usage of e-bike and e-scooters and the occurrences in cases of fires that the public has a good awareness of the charging risks?’ then followed by ‘Please (in a short summary) explain why you answered how you did for the previous answer.’
- ‘Do you think that the information around e-bike and e-scooter rules and regulations have been made easily accessible for users age 16-19?’ then followed by either ‘If yes, how has this been done’ or ‘If no, how could this be improved?’
- ‘Do you think based upon any anti-social behaviour relating to e-scooters and e-bikes you have dealt with, people have a good understanding of the rules related to their usage?’ then followed by ‘Please (in a short summary) explain why you answered how you did for the previous answer.’
- Are you running any public awareness campaigns in your area to educate the public or retailers on the rules relating to e-bikes and e-scooters?’ the followed by ‘If yes, can you detail these campaigns briefly?’
- ‘How reliable do you think the current data on e-bike and e-scooter accidents and injuries is, and what improvements could be made to improve them if necessary?’

‘The vast majority of trips are lawful’

‘engage with retailers and delivery riders’

‘varies by age group and socio-economic group’

‘need for more in depth public education on lithium battery safety’

‘fire hazards when these products are modified’

‘clear format with warning signs’

‘Messaging on platforms young people are actually using’

‘availability of cheap products and conversion options’

‘legal e-bike promotion’

‘schools and colleges... need more awareness too, to enable them to deliver information.’

‘continued engagement and publicity’

‘needs to come from the government’

‘clear, concise and age appropriate guidance at a Government level’

‘multi-agency approach’

‘poor enforcement worsens the issue’

‘the law is fairly clear but the prevalence of rental schemes gives the impression the use of all e-scooters on the highways is legal’

‘people are not aware... that they are illegal’

‘they do not associate an e-scooters as being a motor vehicle’

‘people who use them believe that they have a right to use them on roads and pavements’

‘fairly unreliable. We feel the data available generally under reports the issue’

‘many not reported’ (about accidents)

‘could be improved by better data sharing information’

‘not recorded correctly on the STATS 19’

‘lack of awareness of risks’

‘age group using e-bikes/scooters tend to have less awareness of risk’

‘knowledge is minimal for most of the public with electrical safety in general’

STEP 2 – Key words and codes are created from the selection of the above quotations



STEP 3 – Themes created from the keywords and codes identified

Keep themes at top, see Genene for table - question and quotations (keep this framework and make an appendix)

