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CAN ELECTRIC BIKES EMPOWER FUTURE MOBILITY SOLUTIONS?

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OUTLINE

- Definitions and aims
- Data collections in China and the UK
- Results
- Conclusions
**E-bike** refers to bicycles that have a small electric motor paired with rechargeable batteries to assist the power provided by the user of the bike. To be defined as an e-bike, the vehicle must retain the ability to be pedalled by the rider. This distinguishes e-bikes from electric scooters (e-scooter).
DEFINITION: BIKE SHARING

**Bike Sharing** – a service or a setting where bicycles are pooled for use by many, such as workplace pool bikes, community bike hubs, peer-to-peer bike sharing, or

**Public Bike Sharing Schemes**

A service in which bicycles are made available for shared use to individuals on a very short term basis. It allows people to access the bike from point “A” and return it to point “B”.

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Newcastle University

Civil Engineering & Geosciences
AIMS

• Identify barriers to and enablers of cycling through user experience

• Explore the potential of e-bikes as future mobility solutions
DATA COLLECTION

<table>
<thead>
<tr>
<th>Method</th>
<th>Country</th>
<th>Gender</th>
<th>E-bike</th>
<th>Scooter</th>
<th>C-bike</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire</td>
<td>China (Nanjing)</td>
<td>M (n=169)</td>
<td>18%</td>
<td>34%</td>
<td>53%</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F (n=150)</td>
<td>26%</td>
<td>21%</td>
<td>47%</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total (n=319)</td>
<td>143</td>
<td>176</td>
<td></td>
<td>319</td>
</tr>
<tr>
<td></td>
<td>UK (North East)</td>
<td>M (n=16)</td>
<td>22%</td>
<td>28%</td>
<td>50%</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F (n=16)</td>
<td>9%</td>
<td>41%</td>
<td>50%</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total (n=32)</td>
<td>10</td>
<td>22</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Focus Groups</td>
<td></td>
<td>M (n=10)</td>
<td></td>
<td>42%</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F (n=14)</td>
<td>8%</td>
<td>50%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total (n=24)</td>
<td>2</td>
<td>22</td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>
SAMPLE COMPARISON

• **China (n=319):** all live in urban area, average age=35 (SD=11.5),
  45% e-bike and 55% e-scooter users, modal shift: 44% from car/taxi and
  32% from PT.

• **UK (n=32):** 80% live in urban vs 20% live in rural, average age=55
  (SD=17.6), 33% e-bike and 67% c-bike users.
# IMPORTANCE OF CYCLING

<table>
<thead>
<tr>
<th>E-bike &amp; E-Scooter (China and UK)</th>
<th>C-bike users (UK only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow door-to-door journeys</td>
<td>Healthier</td>
</tr>
<tr>
<td>Avoid stuck in traffic jam</td>
<td>More enjoyable</td>
</tr>
<tr>
<td>Easy to park</td>
<td>Allow door-to-door journeys</td>
</tr>
</tbody>
</table>
## DURATION OF JOURNEY

<table>
<thead>
<tr>
<th>Journey Duration</th>
<th>Bike</th>
<th>Country</th>
<th>Range (minute)</th>
<th>Mean (minute)</th>
<th>Standard Deviation</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortest</td>
<td>E-bike &amp; Scooter</td>
<td>China</td>
<td>1-60</td>
<td>10</td>
<td>7.3</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UK</td>
<td>2-20</td>
<td>10</td>
<td>6.4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>C-bike</td>
<td></td>
<td>5-90</td>
<td>23</td>
<td>24.8</td>
<td>20</td>
</tr>
<tr>
<td>Longest</td>
<td>E-bike &amp; Scooter</td>
<td>China</td>
<td>10-240</td>
<td>43</td>
<td>27.7</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UK</td>
<td>20-360</td>
<td>74</td>
<td>116.2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>C-bike</td>
<td></td>
<td>25-360</td>
<td><strong>135</strong></td>
<td>112.9</td>
<td>20</td>
</tr>
<tr>
<td>Average</td>
<td>E-bike &amp; Scooter</td>
<td>China</td>
<td>5-90</td>
<td>23</td>
<td>12.7</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UK</td>
<td>10-60</td>
<td>26</td>
<td>16.4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>C-bike</td>
<td></td>
<td>15-160</td>
<td><strong>55</strong></td>
<td>47.0</td>
<td>20</td>
</tr>
</tbody>
</table>
FOCUS GROUP – MORE CYCLING?

• **Infrastructure and Environment**
  - Poor status of road surface: e.g. potholes, drains, debris, subsidence
  - Feeling unsafe cycling on the road
  - Lack of consistent cycle lanes and clear signage
  - Lack of good facilities at destinations (e.g. showers, changing room)
  - Traffic, road emission and noise
  - Lack of clear rules and enforcement on where cycling is allowed

• **Accessibility and Health**
  - Affordable e-bikes with choices, e.g. power-assisted braking for arthritic hands.
  - Strong desire for the local authorities to organise social events that provide education and opportunities to practice in safe and secure places
  - Unaware of cycle routes
  - Desire for more bike sharing schemes available and affordable
  - Better understanding of ways to increase health benefits
LESSONS TO LEARN FROM CHINA

Chinese government public consultation: cap the number of shared bikes and rule out shared e-bike scheme

• Lack of legislations and enforcement: many existing e-bikes exceeding the allowed top speed (20km/h)

• Safety concerns:
  • Rider - Lack of education and road safety training for riding heavier and faster e-bikes has led to many road accidents and costs to economy.
  • Infrastructure – lack of fire protection built into charging facilities could lead to hazardous events.
  • Bicycle - lack of proper maintenance is a safety risk.

• Environmental concern: Lead-acid battery disposal.
KEY MESSAGES (UK CONTEXT)

- Create a safe cycling environment and prioritise cycling
- Encourage more bike-sharing schemes
- Strengthen bicycle industry, in particular, the manufacturing of e-bikes
- Increase the awareness of health benefits associated with cycling
FUTURE MOBILITY SOLUTION?

In 1973, 13-year-old Carl pushed his bike up the hill as part of the iconic Hovis advert.

44 years on, Carl has done it again... but this time on an electric bike.

https://www.thesun.co.uk/news/4266832/hovis-ad-lad-finally-makes-it-up-hill/
THANK YOU FOR LISTENING

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