Safety Concerns in Bike-Sharing Systems (BSS)

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Overview

1.) Introduction
2.) Primary Safety Issues
   a.) Helmet Usage
   b.) Bicycle Lanes
   c.) Turning Lanes
   d.) Visibility of Cyclists
   e.) Reckless and Inexperienced Riding
3.) Future Research
4.) Bigger Picture
5.) Conclusion
Benefits of Bike-Sharing Systems

- Solves last/first mile problem
- Environmentally friendly
- Reduces congestion
- Increases physical exercise
- Flexible mode of transportation
Growth of Bike-Sharing in the US

SOURCE: NACTO.ORG
Number of cyclist fatalities in the US from 2009 to 2018

![Graph showing the number of cyclist fatalities from 2009 to 2018](image-url)
Primary Safety Issues

- Low Helmet Usage
- Insufficient Bicycle Lanes
- Insufficient Adequate Cyclist Merging Lanes
- Low Visibility of Cyclists
- Reckless and Inexperienced Riding
Helmet Usage

- Cyclist head injuries make up:
  - 75% of fatalities
  - 33% of emergency room visits
  - 66% of hospitalizations

- Helmets decrease
  - 63-88%

- 151,400 out of 181,150
  - Head injuries could be prevented
Current Initiatives to Increase Helmet Usage

- Helmet laws
- Helmet fitting events
- Giving away helmets
## BSS Helmet Usage

### Helmet Usage in Various Cities

<table>
<thead>
<tr>
<th>City Name</th>
<th>BSS Helmet Usage (%)</th>
<th>Private Helmet Usage (%)</th>
<th>Helmet Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>16</td>
<td>46</td>
<td>n</td>
</tr>
<tr>
<td>Seattle</td>
<td>20</td>
<td>91</td>
<td>y</td>
</tr>
<tr>
<td>Montreal</td>
<td>12</td>
<td>51</td>
<td>y</td>
</tr>
<tr>
<td>NYC</td>
<td>11</td>
<td></td>
<td>y</td>
</tr>
</tbody>
</table>

London, UK  
Seattle, USA  
Montreal, CA  
NYC, USA
Bicycle Lanes

- Shared Bike Lane
- Bike Lane
- Protected Bike Lane
Benefits of Bicycle Lanes

- Decrease Traffic Congestion
- Promote Cycling
- Increase Cyclist Visibility
- Increased Comfort and Safety
Importance of Turning Lanes

- Collisions between cyclists and motorists increase over 10% at intersections
- Bicycle lanes are forced to merge with motorist traffic lanes at intersections
Turning Lanes

Cyclist Turn Signal

Bike Box
Visibility of Cyclists

- Cycling at night is 5 times more dangerous
- 90% of cyclist fatalities occur from collisions with motor vehicles
- Case study showed:
  - 25% of cyclists had front lights
  - 50% had rear reflectors
  - 12% had reflective vests
Bike Swarm
Reckless and Inexperienced Riders

- Highest risk of injury:
  - Young
  - Old

- BSS companies offer:
  - Urban cycling classes
  - Safe riding guides
Future Research

1.) Make helmets more convenient
2.) Use helmets as a “key” to unlock bikes
3.) Incentivize safe riding
Electric Bicycles

Electric Scooters
BSS’s for Health of the General Public

- Air quality is low in certain parts of cities
- Track air quality through sensors
  - Adds data for each sensor onto google maps
  - Color represents air quality index
- Benefits public health
  - Allows people to plan safe routes
Conclusion

- Safety would be improved by:
  - Increasing helmet usage
  - Creating more bike lanes
  - Creating more efficient merging lanes
  - Increasing cyclist visibility
  - Encouraging safe riding
  - Educating riders on urban riding
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