Does street lighting improve cyclist safety?

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UBDC Shaping Cities through Urban Analytics Showcase Event
28th November 2018
Cycling is great!
Is cycling risky?

Vulnerable road user groups

<table>
<thead>
<tr>
<th>Casualty rate per billion passenger miles</th>
<th>1,801</th>
<th>5,604</th>
<th>6,043</th>
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Risk to cyclists at night

1. Is there an increase in risk to cyclists at night?

2. Does street lighting influence risk to cyclists at night?
Cycling at night

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Confounding factors:

Changes in driver characteristics and behaviour

Changes in cyclist characteristics and behaviour
Cycling at night

1. Is there an increase in risk to cyclists at night?

2. Does street lighting influence risk to cyclists at night?

Confounding factors:

- Changes in driver characteristics and behaviour
- Changes in cyclist characteristics and behaviour
- More dangerous road conditions

SOLUTION: Compare collisions in day and dark at same time of day.
Quantifying effect of darkness

CASE HOUR  18:00-18:59
DARK CONTROL HOUR  21:00-21:59
DAYLIGHT CONTROL HOUR  15:00-15:59

Date in year
Time of day
Quantifying effect of darkness – odds ratio

Case hour in darkness ÷ Case hour in daylight

Control hour when case hour in darkness ÷ Control hour when case hour in darkness

= Odds ratio – effect of darkness on cyclist collisions
Quantifying effect of darkness – odds ratio

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= Odds ratio – effect of darkness on cyclist collisions
Quantifying effect of darkness – odds ratio

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= Odds ratio – effect of darkness on cyclist numbers

Odds ratio > 1 = darkness associated with increase in collisions
High number of lights vs Low / no lighting
PROBLEM - Cyclist exposure

More cyclists = more collisions

Fewer people cycle in dark than in daylight
PROBLEM - Cyclist exposure

More cyclists = more collisions

Fewer people cycle in dark than in daylight

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<th>Hour</th>
<th>Mean daily count of cyclists</th>
<th>Percentage reduction</th>
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<td>Apr - Sep</td>
<td>Jan – Mar, Oct – Dec</td>
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<tr>
<td>Case hour</td>
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<td>248</td>
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<td>Control hours</td>
<td>348</td>
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### PROBLEM - Cyclist exposure

More cyclists = more collisions

Fewer people cycle in dark than in daylight, reduction bigger on unlit vs lit roads

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ADJUSTED Odds Ratio

Use collision rates instead of collision counts

Case hour in darkness ÷ Case hour in daylight

Control hour when case hour in darkness ÷ Control hour when case hour in daylight
Use collision rates instead of collision counts.
ADJUSTED Odds Ratio

Case hour in darkness ÷ Case hour in daylight

Control hour when case hour in darkness ÷ Control hour when case hour in daylight

Use collision rates instead of collision counts
Three big datasets

1. STATS19 – road traffic collisions (involving cyclists)

2. Strava – crowdsourced data about cycling trips

3. Street lighting – locations of every light in an area
Cyclist collisions – STATS19

Newcastle

2005 – 2016

Case hour (6-7pm)

Control hours (2-3pm, 10-11pm)
Cyclist estimates – STRAVA

Newcastle
Street lighting – Newcastle City Council

Lights counted in 20 m radius of each collision

Collisions categorised as low or high lighting
Results – overall effect of darkness

(REMINDER: OR > 1 = increased risk after-dark)
Results – influence of lighting on risk

(REMINDER: OR > 1 = increased risk after-dark)
Conclusions and further work

• Importance of accounting for exposure – potential of crowdsourced data like Strava

• Cycling at night is significantly more dangerous than in daylight

• Even after adjusting for exposure, increased lighting did not improve safety, may have decreased it (many caveats though)

• Further work needed to confirm whether lighting has influence on cyclist risk

• Role of cycle lights?
Thanks for listening
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Any questions, if you’ve not fallen asleep?

@AJ_Uttley
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