

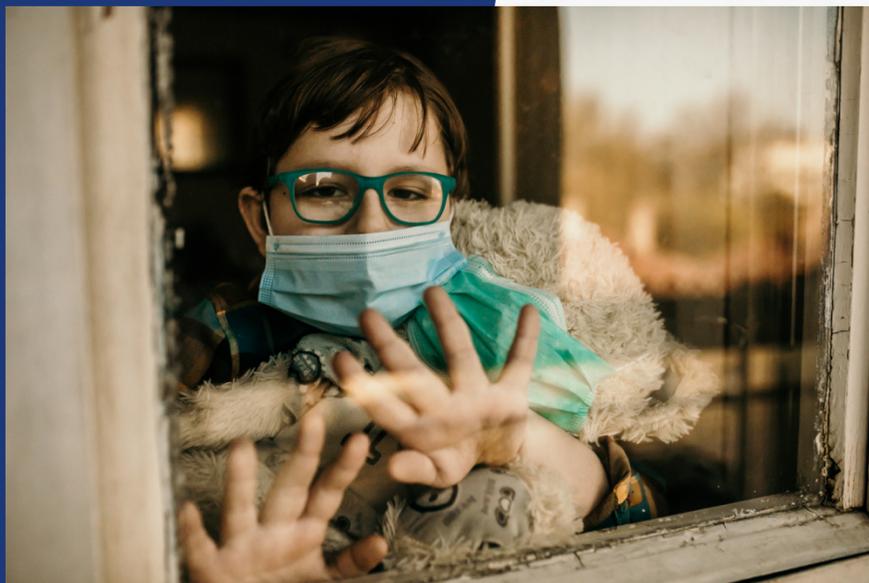
Effects of COVID and Spatial Demography on the Reporting of Cyclists Struck by a Motor Vehicle

presented by

Mickey Edwards, MPA, PhD
Motor Vehicle Data Linkage Project
Center for State Policy and Leadership
University of Illinois Springfield



Center for State Policy & Leadership
UNIVERSITY OF ILLINOIS SPRINGFIELD



Why?

- Inaccurate accounting of traffic violence can lead to the misallocation of mitigating resources.
- Historically disinvested communities miss out on funds to improve their car-alternative transportation infrastructure.
- This research is focused on people and places experiencing elevated rates of unreported cyclists struck by motor vehicles.
- This research provides a more complete understanding of the community impact and what interventions are needed to improve the lives of those most affected.





How?



- Statewide data sets of crash reports from the Illinois Department of Transportation
- Hospital discharge records from the Illinois Department of Public Health
- Customized software and probabilistic matching strategy linking crashes to corresponding hospital discharge file
- Data likely underrepresents the true scale of crashes in Illinois
- Statistical analysis shows data are proportionately representative of the population
- Many cases of cyclists seeking medical treatment after being struck by a motor vehicle remain in the hospital; data for this crash data could not be matched.
- Unmatched cases dubbed unreported.
- It is possible some unmatched cases were reported to police but the linking method failed to complete the match.
- Unreported struck cyclists are also referred to as discordant records.
- A discordance rate is calculated as the ratio of successfully linked cases to candidate cases in the hospital file and presented as a percentage.
- 2020 was treated like a natural experiment and then compared to outcomes from the previous four years.

Did onset of the COVID pandemic influence the decision of struck cyclists to report the crash?

Table 2 Summary

Cyclists less likely to report being struck in 2020 relative to the prior four years.

Struck pedestrians up to 20 percentage points more likely to report being hit compared to cyclists.

Struck cyclists who sustained more severe injuries were more likely to report the incident to police.

More severe injury is more likely to require medical treatment and a response by emergency personnel.

Cyclists with severe head injuries were nearly 20 percentage points more likely to report the crash compared to those with less severe injuries.

Unreported struck cyclists have on average more severe injuries relative to pedestrians.

Rates of unreported struck cyclists balloons by more than 20 percentage points as geography transitions from dense metropolitan areas to more rural areas.

Unreported struck female cyclists in 2020, following the issuance of Illinois' stay at home orders generally increased across geographic types, while simultaneously decreasing among struck male cyclists.

Substance use among struck cyclists is another contributing factor.

2020 saw rates of unreported struck cyclists increase modestly relative to the prior four-year mean.

Among Black cyclists between 2016 and 2019, the rate of unreported struck cyclists jumped 10 percentage points from metropolitan areas to micropolitan areas (areas of less density); in 2020, it increased nearly 18 percentage points.

Among White cyclists between 2016 and 2019, the rate of unreported incidents increased 11 percentage points from metropolitan to micropolitan areas; in 2020, this decreased slightly to just a 10-point difference.

Polysubstance use (any two or more substances) was up slightly in 2020; opioid use was up almost eight percentage points relative to the prior four-year mean.

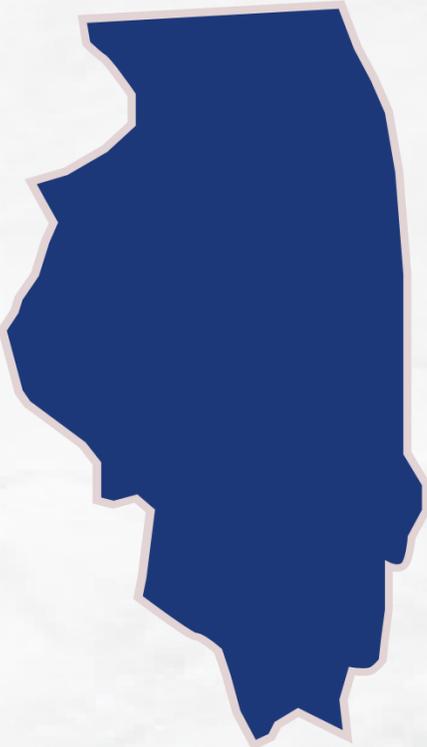
Struck Cyclists and Zip Codes

- Dense, urban areas saw most incidents of unreported struck cyclists for 2016 - 2019 and 2020.
- Based on zip code population, rural communities stand out as being disproportionately affected.
- Carlinville in southwestern Illinois had the highest rate per capita for the years 2016 through 2019.
- Robinson in southeastern Illinois had the highest rate in 2020.
- Demographic shift of typical unreported struck cyclist occurred in 2020 with stay-at-home orders.
- Average poverty rate of an unreported struck cyclist in 2020 was nearly 3 percentage points lower than the prior four-year mean.
- 2020 average carless household rate was 2.2 percentage points lower relative to previous 4 years.
- Increased use of cycles during the worst of pandemic lockdowns among the wealthier could imply an effort to avoid contact on public transit.
- Typical unreported struck cyclists in 2016-2019 and 2020 lived in zip codes with 3 and 2.6 times, respectively, the rate of carless households compared to the Illinois state average.
- Compared to average Illinois poverty rate, crashes occurred among residents of zip codes with an average rate nearly 7 points higher in 2016-2019, and just under 4 percentage points higher in 2020.
- While there was a bit of an adjustment in 2020, this still disproportionately affected the socioeconomically disadvantaged.



Table 3

Descriptive statistics of discordant struck cyclists measured at the zip code level*



Cohort	Mean	Median	Standard Deviation
2016-19 Carless Household Rate	17.3%	14.5%	10.6%
2016-19 Poverty Rate	18.5%	17.6%	9.10%
2020 Carless Household Rate	15.1%	11.6%	10.7%
2020 Poverty Rate	15.6%	13.5%	9.01%



*2019 5-Year American Community Survey estimates



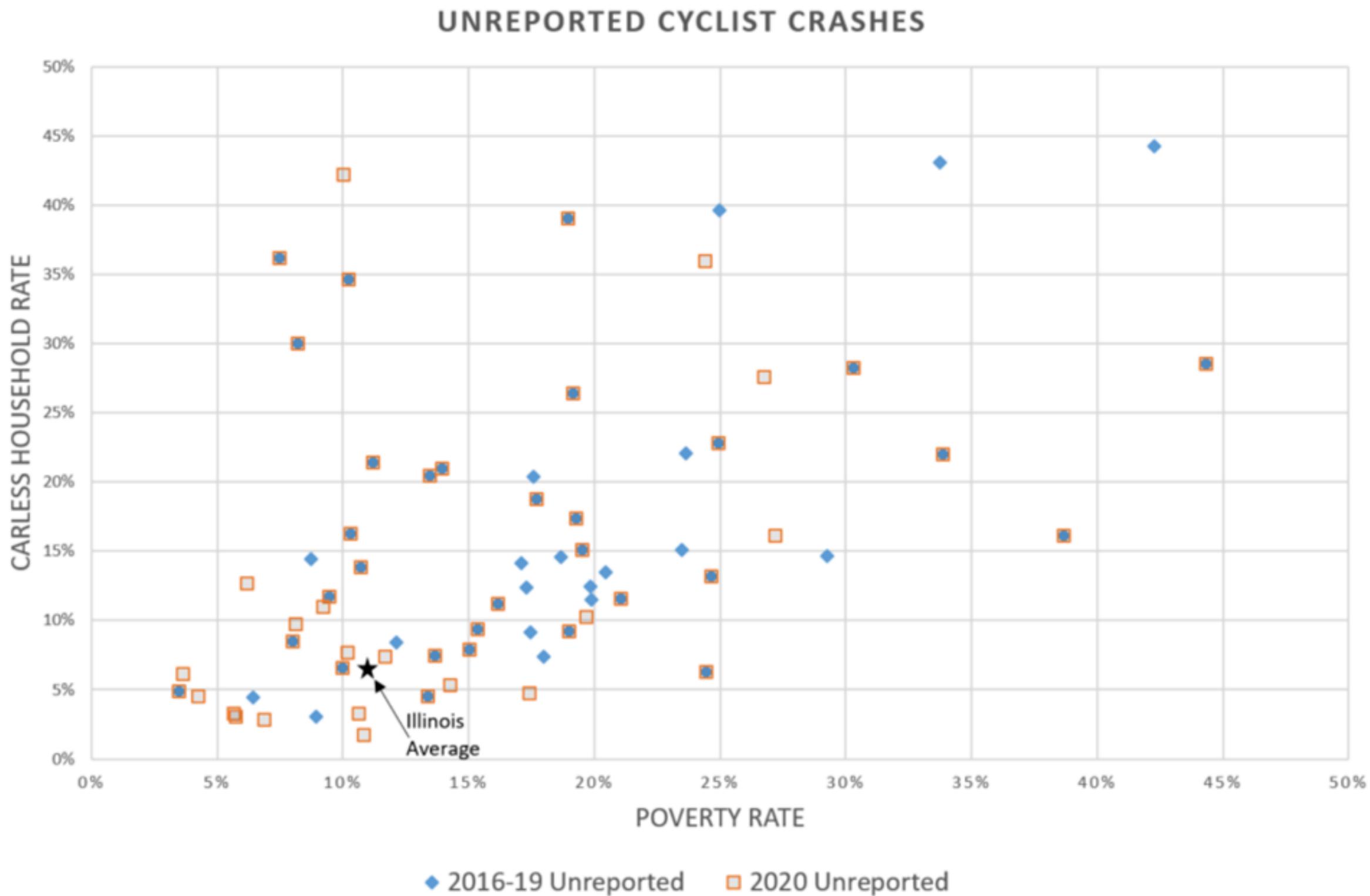
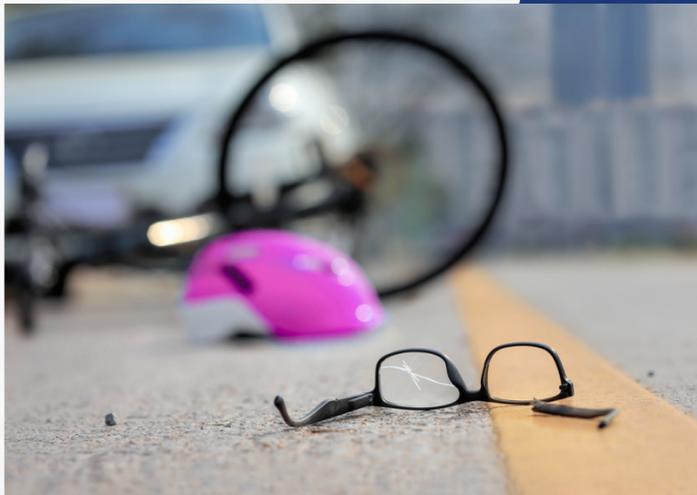
Poverty vs. Carlessness



- Among pedestrians, without exception, zip codes with the highest discordant rates are among members of communities with poverty and carlessness rates far above the Illinois average.
- Among cyclists, the zip codes with the highest discordant rates cuts a much wider swath, and are much more evenly distributed across communities of both high and low rates of poverty and carlessness.
- Distribution of unreported struck cyclists is more likely to be below and to the left of the Illinois average – implying poverty and carlessness rates below the average.
- Existing especially among the treatment group (2020) are high discordant rate zip codes with high, and very high, rates of carlessness but below average poverty rates.
- This implies that rather than being forced into alternative transport modes like cycling because of an inability to afford a car – the car-less, some unreported strikes may be among the relatively better off who are simply in pursuit of a car-free lifestyle.



Figure 1



*2019 5-year American Community Survey estimates

Characteristics of Struck Cyclists

- For the first time, 2020 saw a statistically significant and negative relationship between car ownership and unreported struck cyclists.
- For the first time, living in a zip code with higher carlessness was associated with a greater likelihood of not reporting being struck on a cycle.
- Prior to 2020, the reverse was true.



Table 4

Unreported struck cyclist characteristics association with high incidence per capita: results of segmented binary logistic regression model



Variable	Coefficient (2016-2019)	Odds Ratio (2016-2019)	Coefficient (2020)	Odds Ratio (2020)
<i>Built Environment</i>	0.315*	1.37*	0.391*	1.48*
<i>Carless Household Rate</i>	5.63*	278*	-4.77*	0.008*
<i>Poverty Rate</i>	6.90*	988*	7.32*	1515*
<i>Child Poverty Rate</i>	-3.40**	0.033**	-0.430	0.651
<i>Hispanic</i>	-0.122	0.886	-0.657*	0.518*
<i>White</i>	-0.181	0.834	0.414	1.51
<i>Black</i>	-0.521*	0.594*	-0.167	0.846
<i>Asian</i>	-0.888*	0.412*	-0.311	0.732
<i>Other (race)</i>	-0.152	0.859	0.823***	2.28***
<i>Median Household Income</i>	0.00*	1.00*	0.00*	1.00*

*Significant at 1%; **Significant at 5%; ***Significant at 10%

Conclusion

- Access to these data and when examined in this manner, they can be useful to policymakers, transportation planners and engineers, and community members when conducting road safety assessments.
- More accurate information can result in a more equitable distribution of mitigation funding and efforts within the communities that need it the most – so that investments can be made in car-alternative transport infrastructure and decrease the risk exposure for those outside of cars.
- Future studies should focus on investigating the dynamics underlying the factors outlined here – specifically in a manner that permits community outreach to encourage the reporting of all crashes.

