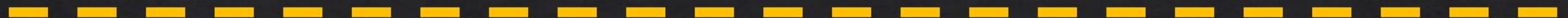# Sharing the Road: Experienced Cyclist and Motorist Knowledge and Perceptions

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Overview

- More people are cycling but sharing the road has dangers
- We explore two contributing factors:
  - Knowledge of cycling-specific laws
  - Differential hazard perception
- Results
  - Surveyed motorists demonstrated some misunderstanding of the law
  - Motorists recognize cyclist vulnerability, but do not actively monitor for the same hazards
- Improved communication of the law and understanding of cycling hazards are needed

Some Norfolk commuters would rather bike to work

Inside Business   Sandra Pennecke   April 9, 2019

"It gives me time to think and it's also great exercise"

Bike commuting is relaxing and reduces your carbon footprint

"Hampton Boulevard is its own nightmare, so without the Elizabeth River Trail it wouldn't be possible"

Sharing the Road

- Steady fatality rate for vulnerable road users since 1995 (2% of total road traffic fatalities)
  - 5% increase in vulnerable road user fatalities from 2006-2015
  - 95% of U.S. cyclist traffic fatalities involve a motor vehicle

- Cyclists report regular "close calls" (Aldred & Crosweller, 2015)
- Motorist report regular annoyance (Haworth, Heesch, & Schramm, 2018)
  - Is there a misunderstanding of what cyclists are doing on the road?

	90 cyclists	41 motorists
	63 males	7 males
◈ Sex	52 (SD = 12)	28 (SD = 7)
◈ Age	60% > $100,000	78% < $100,000
◈ Income	40% Bachelors, 48% Graduate	95% some college
◈ Education	36 (SD = 13)	12 (SD = 8)
◈ Years Driving	13375 (SD = 7314)	12070 (SD = 8150)
◈ Annual Driving	4400 (SD = 2351)	8 (SD = 14)
◈ Annual Cycling		

Rules for Sharing the Road

◇ Rules for Motorists (8 items)

   ◇ T/F Motorists should not drive in a bike lane except when turning

      81% cyclists   64% motorists

   ◇ T/F The law requires that motorists pass bicyclists at a reasonable speed and allow at least three feet of space

      99% cyclists   93% motorists

   ◇ T/F If no bike lanes or shared lane markings are present the motorist has complete right-of-way

      99% cyclists   55% motorists

Sub-score   93% cyclists   82% motorists $t(129) = 5.394$, $p < .001$, *Cohen's d* = 1.02

Rules for Sharing the Road

◈ Rules for Cyclists (19 items)

   ◈ T/F   Bicyclists should not pass on the right of motorists at intersections

                                    76% cyclists   74% motorists

   ◈ T/F   Bicyclists should ride on the sidewalk when a sidewalk is available

                                    100% cyclists   57% motorists

   ◈ T/F   Bicyclists are required to ride within 3 feet of the curb

                                    86% cyclists   24% motorists

   ◈ T/F   Bicyclists are required to use the bike lane or separate multi-use path when they are available

   **66% cyclists   7% motorists**

Sub-score   76% cyclists   57% motorists $t(129) = 8.284$, $p < .001$, *Cohen's d* $= 1.56$

Shared Expectations

- Experienced motorists and cyclists are quicker to detect hazards and have greater situation awareness (Crundall, 2016; Lehtonen et al., 2016; Ventsislavova et al., 2016)
  - But are they sensitive to the same hazards?

- Surveyed for perceived cycling road hazards and for actual avoidance of hazards

Perceived Hazards

◈ There are many potential hazards on the roadway. Please rate how hazardous you believe the following conditions or situations would be when (you are/someone is) riding a bicycle

1   2   3   4   5

Not at all hazardous

Very hazardous
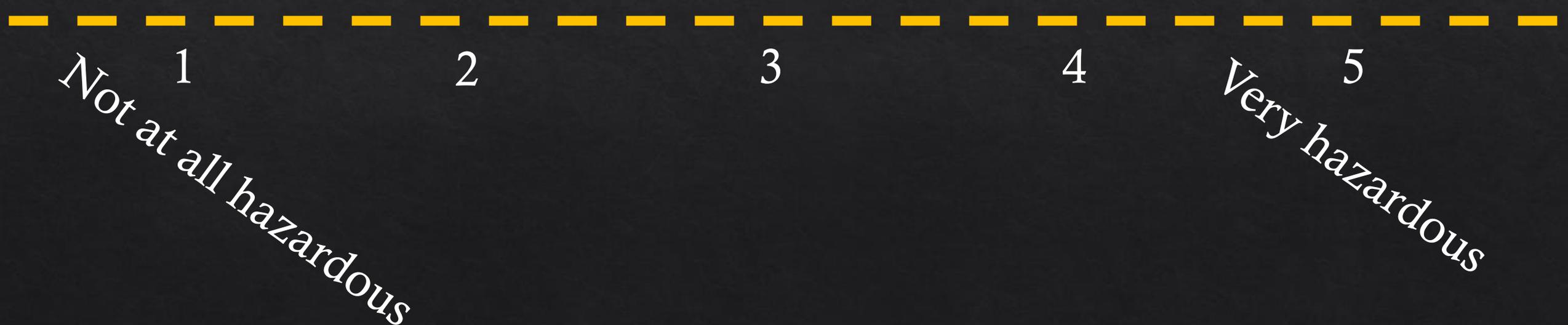
Hazards: Road and Weather

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	🚲	🚗
◈ Potholes or broken road surfaces	3.89	✸ 4.29
◈ Speed bumps, railroad tracks other uneven surfaces	3.21	3.73
◈ Metal grates, manhole covers, storm drains	3.51	3.66
◈ Broken glass or other sharp objects	✸ 3.98	✸ 4.27
◈ Sticks, rocks or other small debris	3.44	3.63
◈ Boxes, furniture, logs or other large debris	3.74	4.15
◈ Standing water	3.44	4.10
◈ Gravel or sand	3.59	3.68
◈ Strong crosswinds	3.12	4.07
◈ High speed limit	✸ 4.08	4.07
◈ Numerous stoplights or stop signs	2.63	3.15

$t(129) = -3.024$, $p = .003$, *Cohen's d* = -0.57   3.51 (*SE* = 0.07)   3.89 (SE = 0.11)

Hazards: Interactions with Motorists

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🚲 🚗

- Vehicle passing too close   💥 4.73   💥 4.56
- Vehicle following too close   💥 4.48   💥 4.63
- Vehicle impact from behind   💥 4.73   💥 4.85
- Crashing into a vehicle   💥 4.32   💥 4.76
- Distracted drivers   💥 4.87   💥 4.78
- Colliding with open car door   💥 4.33   💥 4.63

t(129) = -1.167, *p* = .246, *Cohen's d* = -0.22   4.58 (*SE* = 0.05)   4.69 (*SE* = 0.09)

Hazards: Interactions with Non-Motorists

	🚲	🚗
◈ Other bicycles and cyclists	3.17	3.76
◈ Crashing into a pedestrian	3.79	4.34
◈ Unexpected pedestrian crossing	3.54	4.20
◈ Unexpected animal crossing	3.66	4.07

$t(129) = -3.120$, $p = .002$, *Cohen's d* = -0.59   3.54 (*SE* = 0.11)   4.09 (*SE* = 0.13)

Perceived Hazards

◈ Overall, cyclists rated all situations as less hazardous (M = 3.82, SE = 0.06) than motorists (M = 4.16, SE = 0.09), $t(129)$ = -3.368, $p < .001$, *Cohen's d* = -0.64.

◈ Motorist see cyclists as vulnerable road users

◈ Experienced cyclists are confident in their abilities

◈ Cyclists rate interactions with motorists as the greatest hazard

Hazard Avoidance

◈ When riding on the road, what might cause you to ride toward the middle of the lane as opposed to the right side of the lane?

◈ When driving on the road, what might cause you to move toward the center of the road or cross the centerline?

Hazard Avoidance

	🚲	🚗
◈ Narrow roadway	💥 0.71	0.50
◈ Road has no shoulder	💥 0.86	0.19
◈ Road has tall curbs	0.48	0.12
◈ Cars parked on the roadway	💥 0.97	💥 0.71
◈ Number of lanes same direction	0.48	0.14
◈ Light vehicle traffic	0.19	0.07
◈ Vehicles approaching from the side	💥 0.67	💥 0.62

Hazard Avoidance

	🚲	🚗
◈ Broken or uneven road surfaces	💥 0.90	0.48
◈ Gutters or storm drains	💥 0.88	0.29
◈ Large obstacles near edge of the road	💥 0.94	💥 0.81
◈ Strong crosswinds	💥 0.52	0.33
◈ Heavy pedestrian traffic	0.46	0.55
◈ Nothing changes my lane position	0.02	0.07

Hazard Avoidance

◈ Cyclists actively avoid more of these 12 potential hazards ($M = 8.04$, $SE = 0.24$) than motorists ($M = 4.93$, $SE = 0.43$), $t(129) = 6.823$, $p < .001$, *Cohen's d* = 1.29.

◈ Motorists and cyclists do not actively avoid the same hazards

Conclusions

◇ Cycling related law and policies are not widely known or understood

◇ Expertise as a motorist may not be sufficient to predict cyclist behaviors on the roadway

   ◇ Dangerous and frustrating!