

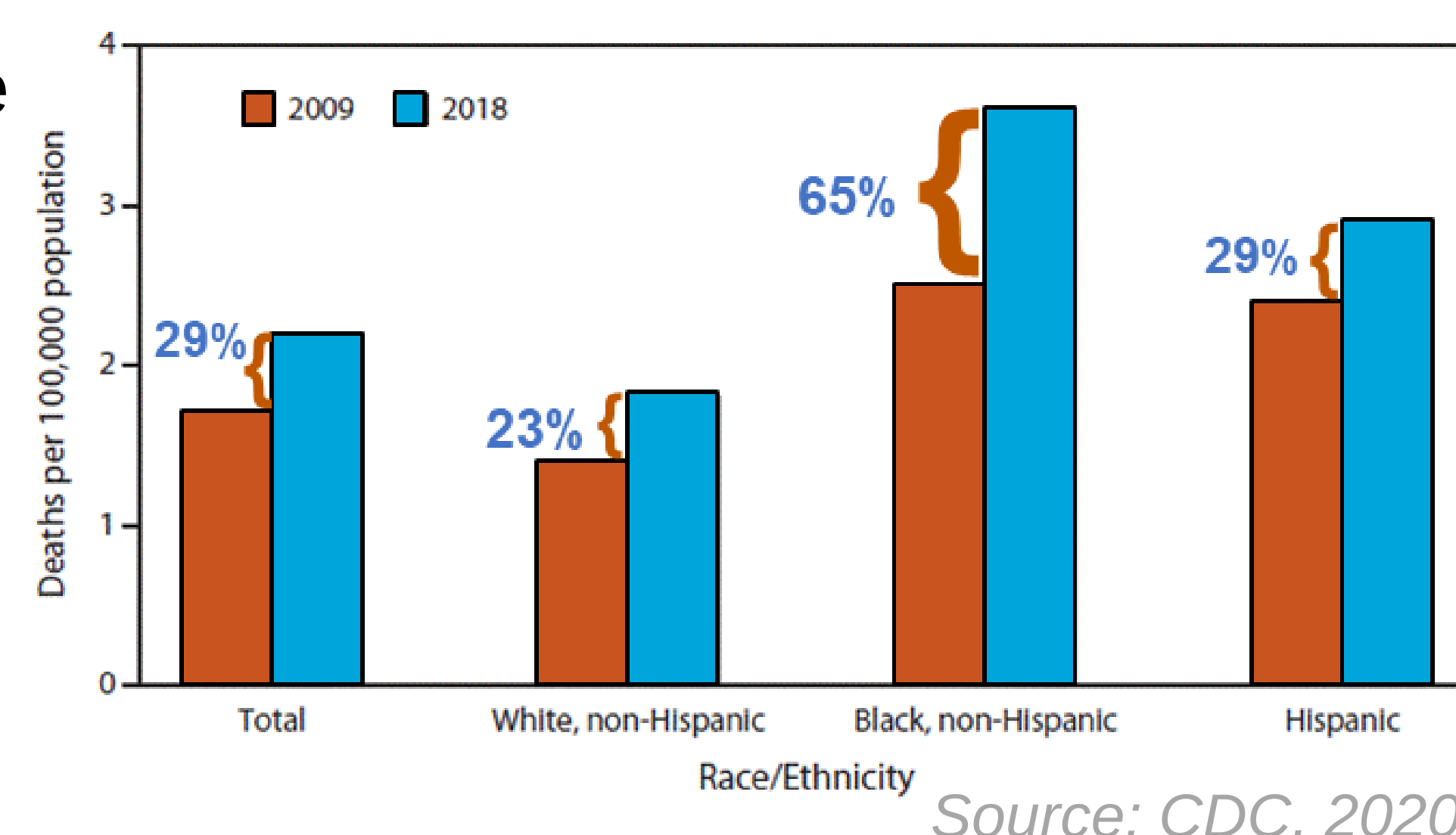
BACKGROUND

State of Pedestrian Safety in the U.S.

- Data from 2020 and preliminary data from 2021 indicate record-high fatality rates (*Smart Growth America, 2022*).
- 18 people were killed, on average, per day in 2020.
- Fatalities increased by 62% between 2009 and 2020
- BUT...** Walking trip share has remained constant at 10.5%.

Racial Disparities

- Racial/Ethnic disparities are stark!
- Black and American Indian pedestrians have a higher pedestrian crash risk.
- The scale of disparity has significantly increased over time.



OBJECTIVES

- Unpack the magnitude effects of the determinants of pedestrian crashes using a multivariate analysis approach.
- Examine reasons for racial disparity in pedestrian crash involvement.
- Undertake investigations of (1) and (2) by identifying majority Black (MB) and majority non-Black (NMB) Census Block Groups (CBGs).

DATA

Crash data was obtained between 2012 & 2021 for Houston, TX from the Crash Records Information System (CRIS) database and aggregated at the Census Block Group (CBG) level.

Block Group Type	CBG Type	Number of crashes per CBG	Fraction of Black crashes per CBG
	Relative Frequency (%)	Mean	Mean
Majority Black (MB)	14.8	0.423	0.577
Majority Non-Black (NMB)	85.2	0.306	0.210

CAUSES OF PEDESTRIAN CRASHES

Exposure

- Higher use of transit
- More walking
- Lower vehicle ownership levels

Social Resistance

- Minorities may develop a collective identity in opposition to that of the dominant group. Therefore, they may tend to engage in **high-risk behaviors** such as unsafe driving and walking behaviors (*Factor et al., 2013*).

Built Environment

- Poor street lighting
- Missing sidewalks
- Proximity to dangerous highways and arterials
- High density of four or more legged intersections
- Not enough safe places to cross

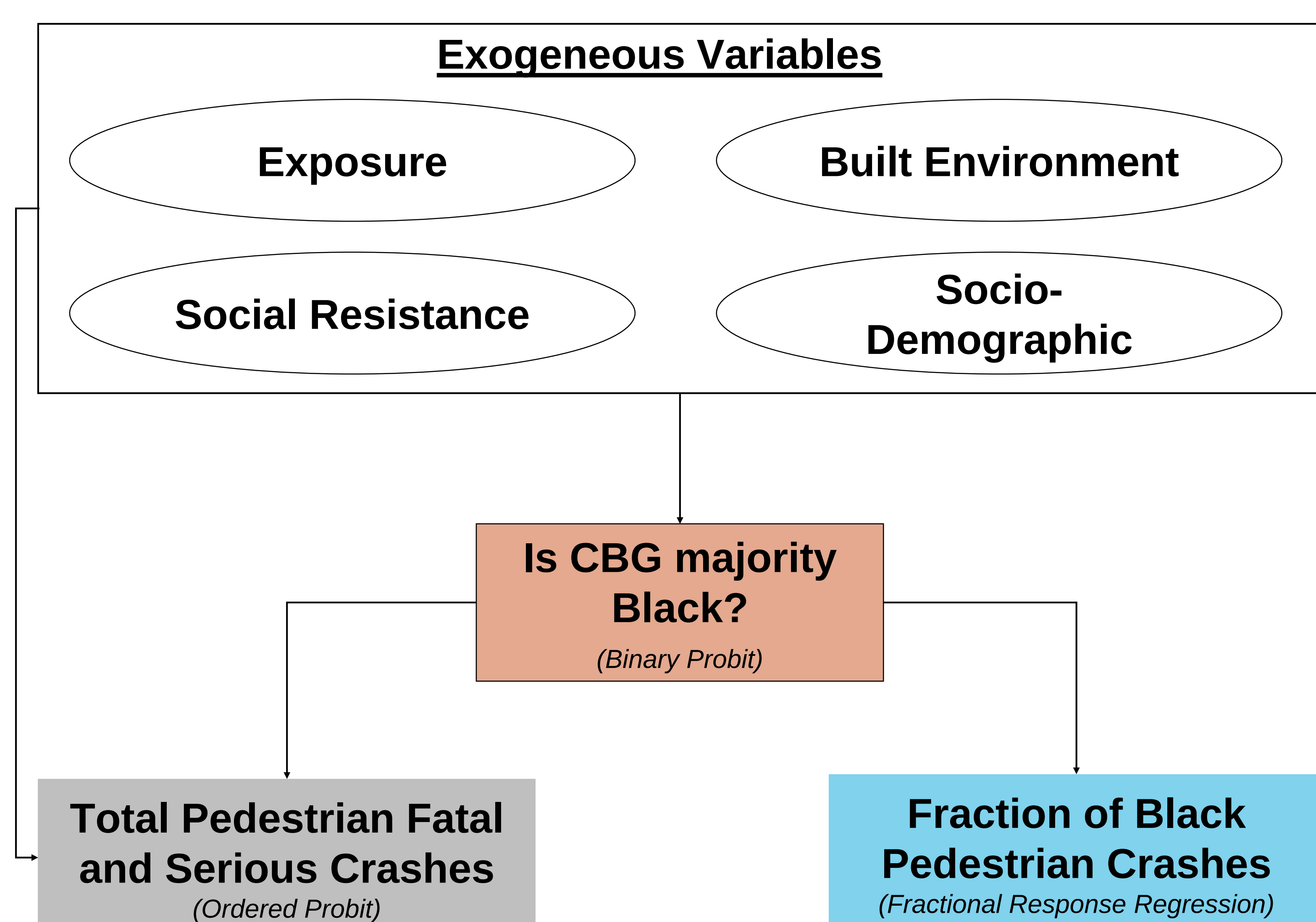
Socio-Demographic

- Younger population
- Type of work requiring travel during adverse conditions

Motorist Yielding Behavior

- Field experiments found that compared to white pedestrians:
 - Black pedestrians were passed by > twice as many cars**
 - Black pedestrians waited 32% longer to cross** (*Kahn et al., 2021*).

MODELING FRAMEWORK



RESEARCH FINDINGS

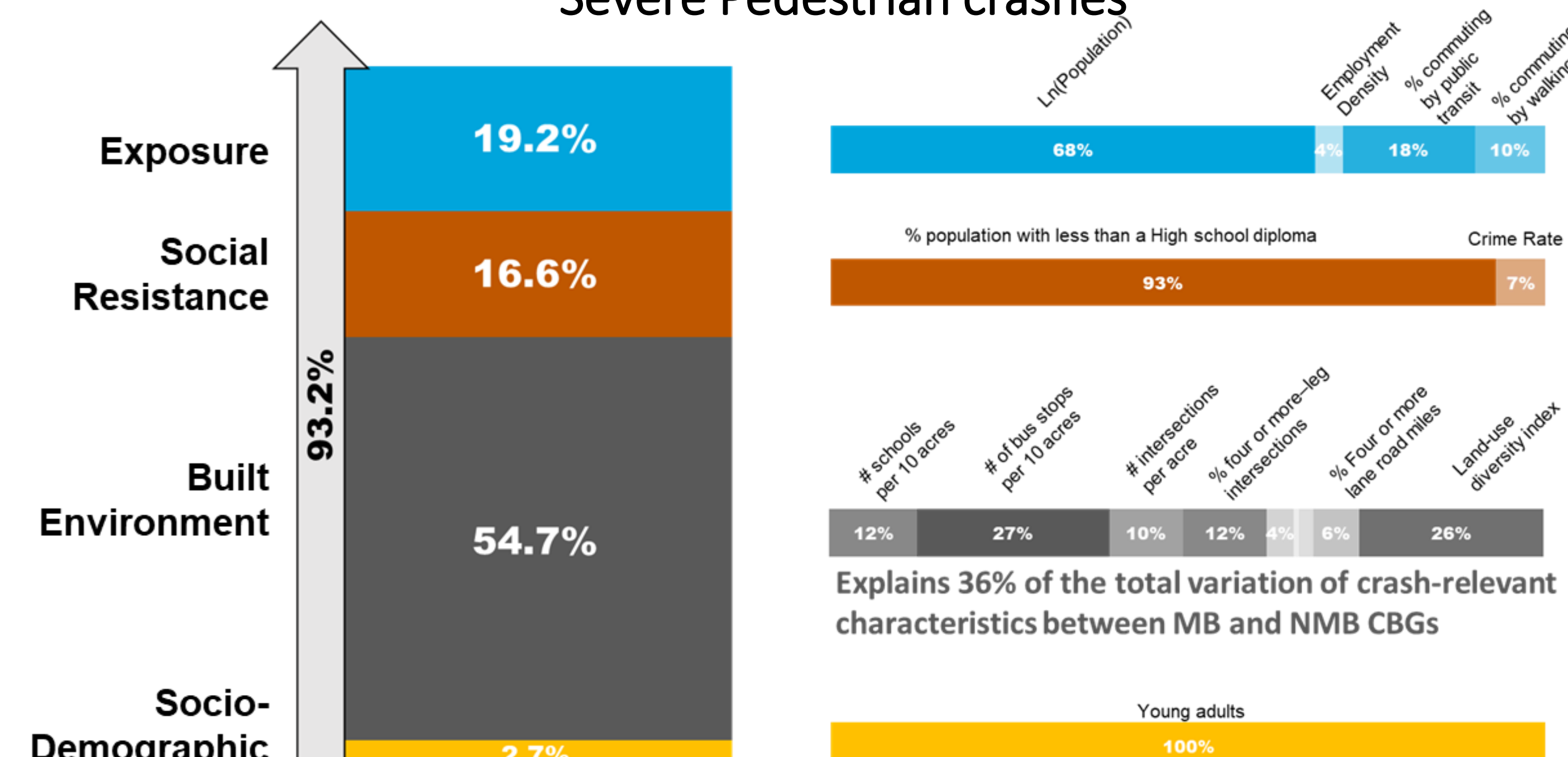
Model 1: Difference between MB and NMB CBGs

- Majority Black Census Block Groups have:

- Lower employment density
- Higher bus stop density
- Lower sidewalk coverage
- Less traffic signals
- More households with zero cars
- More individuals using transit
- Higher crime rates
- More four or more-legged intersections
- More freeways and wide roads

Model 2: Total pedestrian fatal and serious crashes

Relative Contribution of Exogenous Variables to the Total Number of Fatal and Severe Pedestrian crashes



- Social resistance considerations, pedestrian facilities in proximity to transit stops, and road design considerations are the three strongest determinants of pedestrian crashes, particularly in MB CBGs.
- Built environment attributes are the most important variables, while also representing the most differentiating variables between MB and NMB CBGs.
- There is a **“remnant”** effect that elevates crash risk at MB relative to NMB CBGs. (due to motorist yielding differences between Black and non-Black pedestrians?)

Model 3: Fraction of Black pedestrian crashes

- The fraction of Black pedestrian crashes is > at:
 - NMB CBGs. **Implicit racial bias?**
 - Areas with higher intersection densities. **Driver yielding bias?**
 - Areas with higher crime rates. **Socially resistant behavior**

FINAL THOUGHTS

Transportation safety engineers **MUST** work with social scientists and engage with community leaders to build trust before leaping to implement engineering countermeasures.

LINK TO PAPER

