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## Webinar: Racial Bias in Driver Yielding Behavior at Crosswalks

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# Racial Bias in Driver Yielding Behavior at Crosswalks

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# Collaborators

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# Pedestrian experiences at crosswalks

- Potential point of conflict with drivers
- Safety concerns
- Racial minorities overrepresented in pedestrian fatalities (CDC, 2013)
- Are racial minorities being treated differently by drivers at crosswalks?



# Drivers' treatment of pedestrians

- Drivers treat pedestrians differently
  - Drivers of high-status cars are less likely to yield to pedestrians than those with low-status cars (Piff, Stancato, Côté, Mendoza-Denton and Keltner, 2012)
  - Drivers are more likely to yield to people who are in their own age group (Rosenbloom, Nemrodov and Ben Eliyahu, 2006)
  - Driver are more likely to yield to disabled individuals (Harrell, 1992)

# Drivers' treatment of pedestrians by race

- Examined if pedestrian race influenced drivers' stopping behavior with Black and White male pedestrians (Goddard, Kahn, & Adkins, 2015)
- Controlled field experiment
  - Black and White male pedestrians waited to cross the street at a marked crosswalk in Portland, Oregon
- Black male pedestrians were passed by twice as many cars and waited 32% longer than White male pedestrians.

# Drivers' treatment of pedestrians by race

- May reflect implicit biases
  - Subtle, biased beliefs that individuals hold beneath their conscious awareness  
(Greenwald & Banaji, 1995)
- Driving conditions conducive for implicit bias
  - Fast paced
  - Discretion
  - Distractions

# Current Project

Extended this research on drivers' yielding behavior:

- Controlled field experiments:
  - pedestrian race and gender
  - marked and unmarked crosswalk
  - drivers' identity
- Focus groups
  - African American pedestrians' experiences



# Field Experiment

- Experimentally examine pedestrian race, pedestrian gender, and crosswalk design on drivers' yielding behavior toward pedestrians crossing the street.
- Run twice at the same location
  - Unmarked crosswalk (Phase 1)
  - Marked crosswalk (Phase 2)
- Trained coders recorded outcomes of crossing trials

# Field Experiment: Location

- SE 14<sup>th</sup> and SE Belmont in Portland, OR
  - Two lane, one way street
  - Two blocks downstream from an intersection with a traffic light
- Phase 1, Sept 2015: unmarked, legal crosswalk at intersection
- City marked crosswalk in April 2016
  - Zebra stripes, signage directing drivers to stop, stop bar
- Phase 2, June 2016: marked crosswalk

# Field Experiment: Location



# Field Experiment: Pedestrians

- 12 pedestrians/phase: 3 Black men, 3 White men, 3 Black women, and 3 White women
  - Between 18 and 30 years
  - Prototypical of race and gender
- Appearance standardized during study
- Trained in crossing procedure



# Field Experiment: Procedure

- Trials between 2pm-5pm
- Trial began when first car from traffic light change hit designated spot
- Pedestrian approach edge of crosswalk, position body with intent to cross
- Trial ended when:
  - 1) car clearly yielded
  - 2) entire platoon passed without yielding

# Field Experiment: Procedure

- Pedestrian crossed and next pedestrian cued when out of sight
- Pedestrians given randomized order, crossed individually
- Trials in which non-study pedestrians or bikers joined were excluded
- Mild and clear conditions



# Field Experiment: Recorded Data

- 5 trained coders
- Recorded data:
  - 1) *First car stop*: yes or no.
  - 2) *Cars passed*: recorded as a count of cars.
  - 3) *Trial length*: in seconds
  - 4) *Driver stop characteristics*: race (white, nonwhite, unknown) and gender (coded as: male, female, unknown) of the driver who stopped

# Field Experiment: Recorded Data

5) *Stop bar (Phase 2 only)*: coded as before or after.

- Before the stop bar is obeying signage and leaving more space to cross
- After the stop bar is closer to pedestrian and infringing on crossing space.



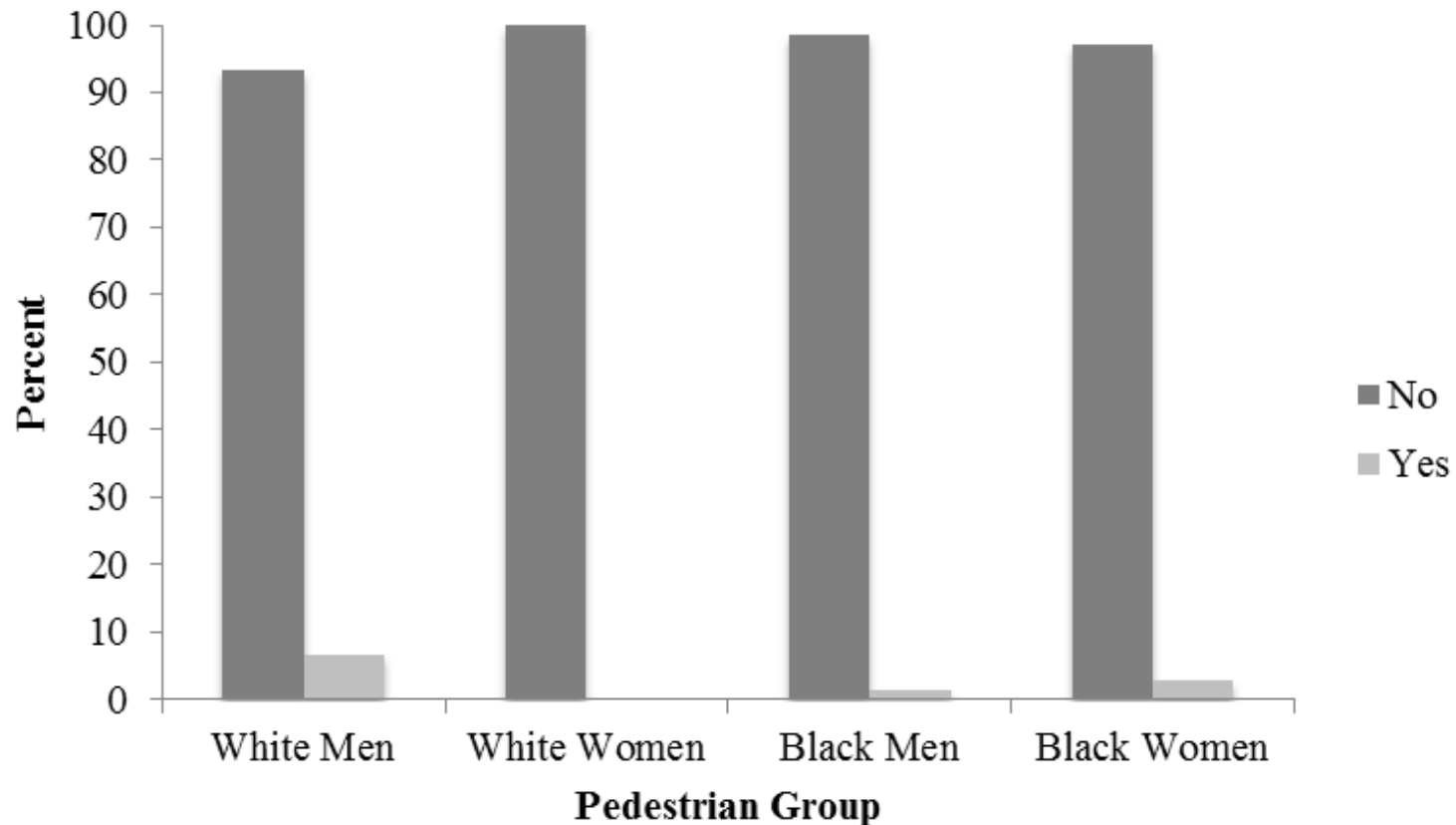


# Results: Field Experiment, Phase 1 unmarked crosswalk

- 330 trials, 11 eliminated
  - 319 trials: 90 White female, 67 Black female, 91 White male, 71 Black male
- In 60 out of 319 trials (18.8%), one car from the passing platoon stopped for the pedestrian
  - Potential floor effect

# Results: Phase 1, First Car Stop

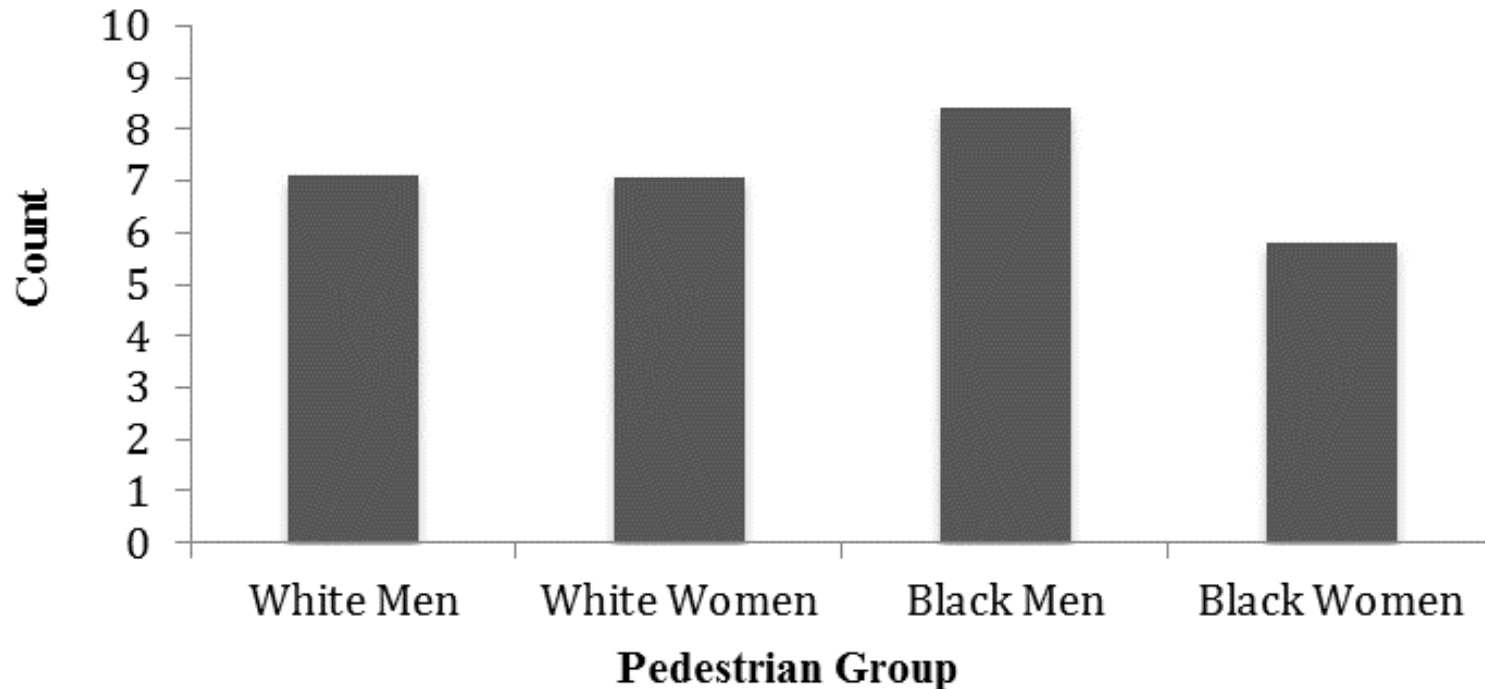
## First car stop (unmarked crosswalk)



- First car stopped on 9/319 trials (2.8%)
- $\chi^2(3, N=319) = 7.86, p=.05$ , simple effects *ns*

# Results: Phase 1, Cars Passed

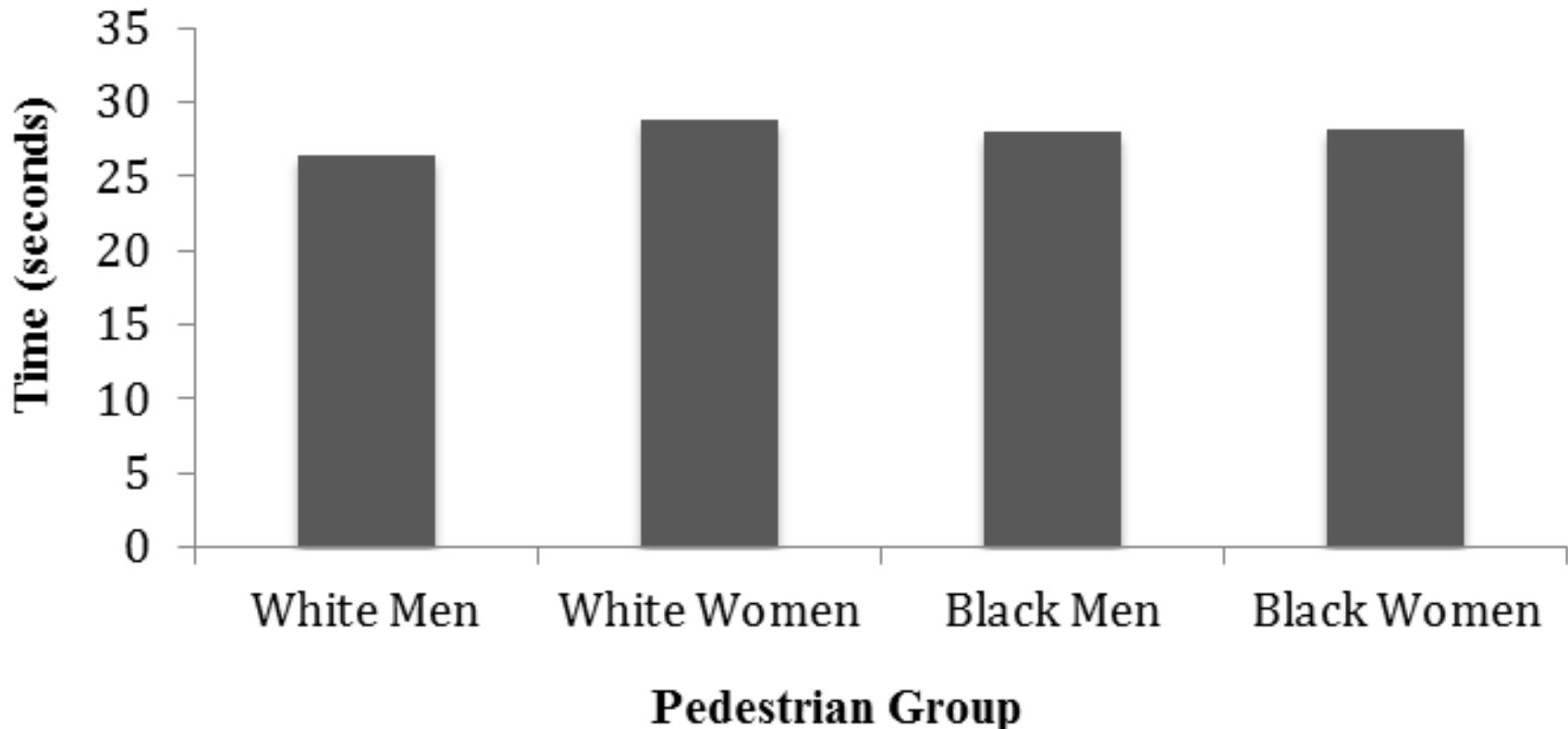
## Cars Passing Without Yielding (unmarked crosswalk)



- 60/319 trials where a car stopped
- 2x2 ANOVA , all *ns*

# Results: Phase 1, Trial length

## Trial Length (unmarked crosswalk)



- 2x2 ANOVA , all *ns*

# Results: Phase 1, Driver characteristics of car that stopped

- 60 drivers who stopped:
  - Gender: 32 males, 19 females, 9 unknown
  - Race: 48 White, 3 nonwhite, 9 unknown
- Driver gender,  $\chi^2(2, N=52) = 1.41, p=.70$  and driver race,  $\chi^2(2, N=52) = 1.40, p=.71$  did not predict which pedestrian groups were yielded to.

# Phase 1 Conclusions

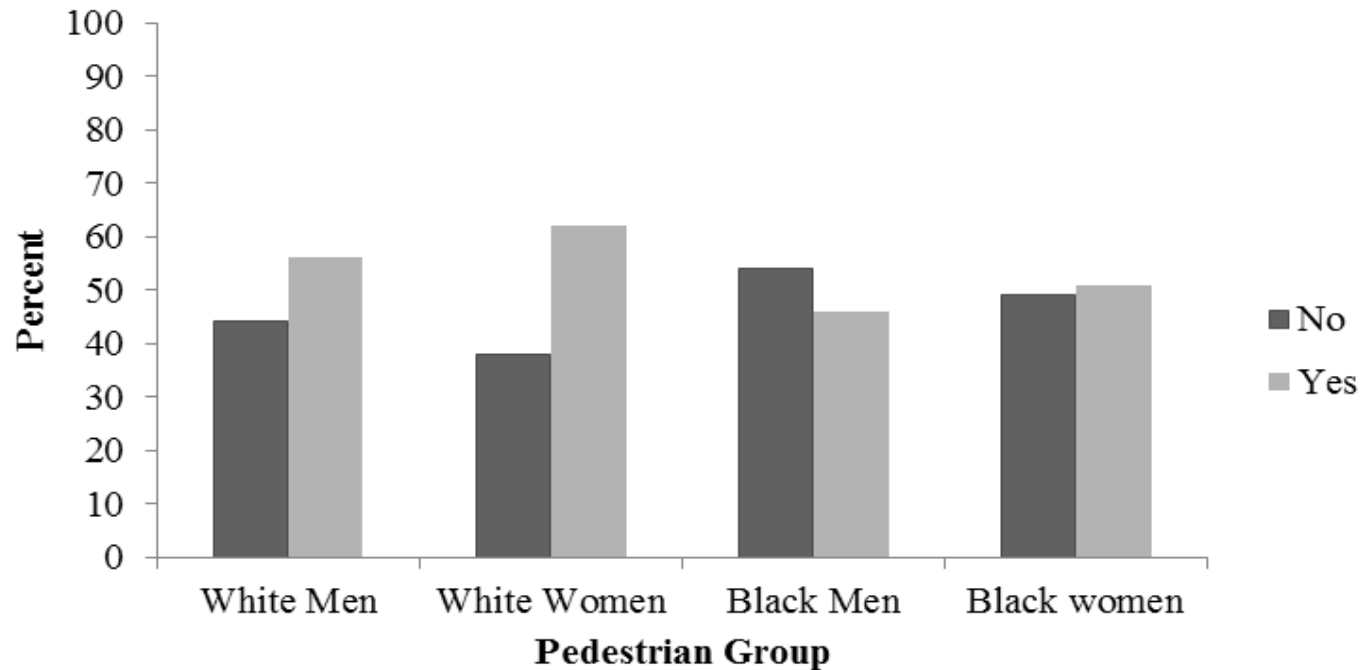
- Drivers did not differentiate among Black and White men and women at the unmarked crosswalk
- Overall low stopping rates
  - 18% of trials in which any car stopped, 2.8% first car stop
  - Drivers did not yield to waiting pedestrians, despite Oregon law that any intersection is a crosswalk

# Field Experiment, Phase 2 marked crosswalk

- 12 new study pedestrians
  - 3 from each race and gender group
  - Ages 18-30, (avg 23.0 years)
  - Similar build, prototypical of race/gender
  - Due to attrition, 1 Black female completed trials
- 485 trials at marked crosswalk, 76 trials eliminated with non-study individuals
  - 409 total trials: 129 White female, 110 White male, 115 Black male, 55 Black female
- Car yielded on 396 out of 409 trials (96.8%)

# Results: Phase 2, First Car Stop

## First car stop (marked crosswalk)

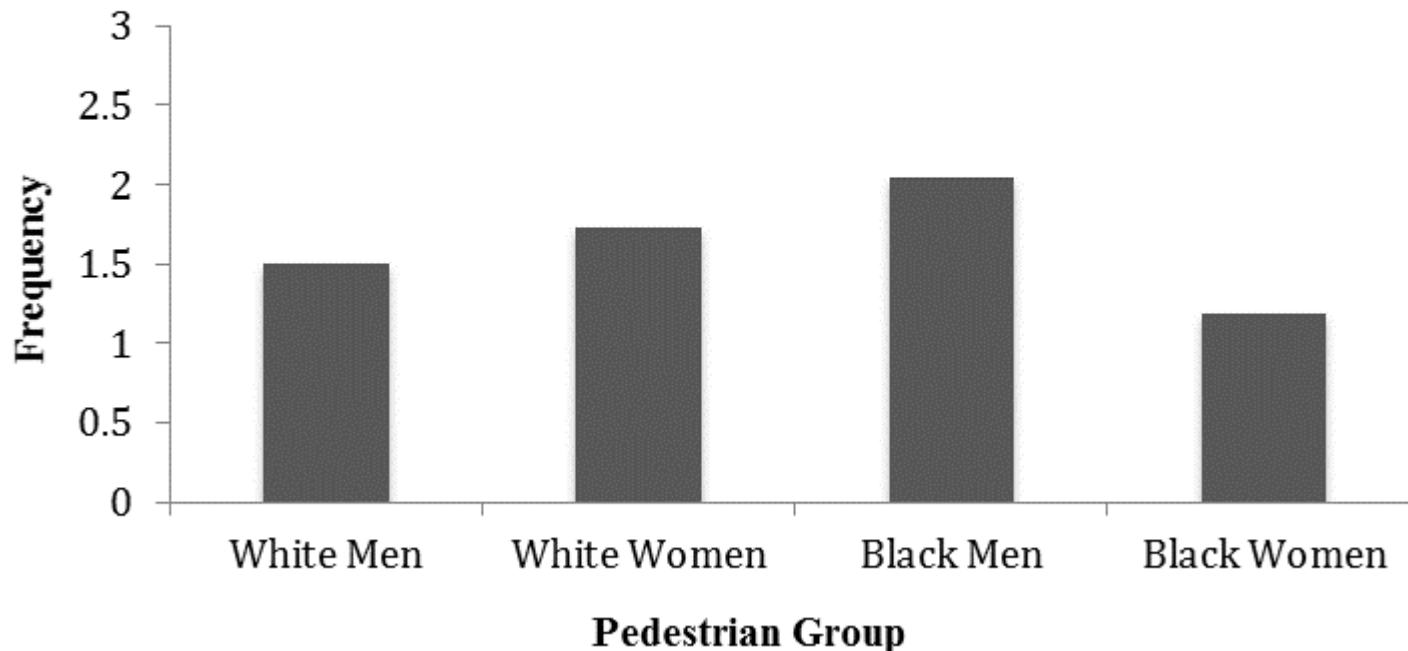


- First car stopped on 208 out of 380 trials (55%),  $\chi^2(3, N=380) = 6.25, p=.10$ ,
- White peds more likely to have first car stop (59%) than Black peds (49%),  $\chi^2(1, N=378) = 3.87, p=.05$ .
- Female peds more likely to have first car stop (61%) than male peds (51%),  $\chi^2(1, N=378) = 4.06, p=.04$



# Results: Phase 2, Cars Passed

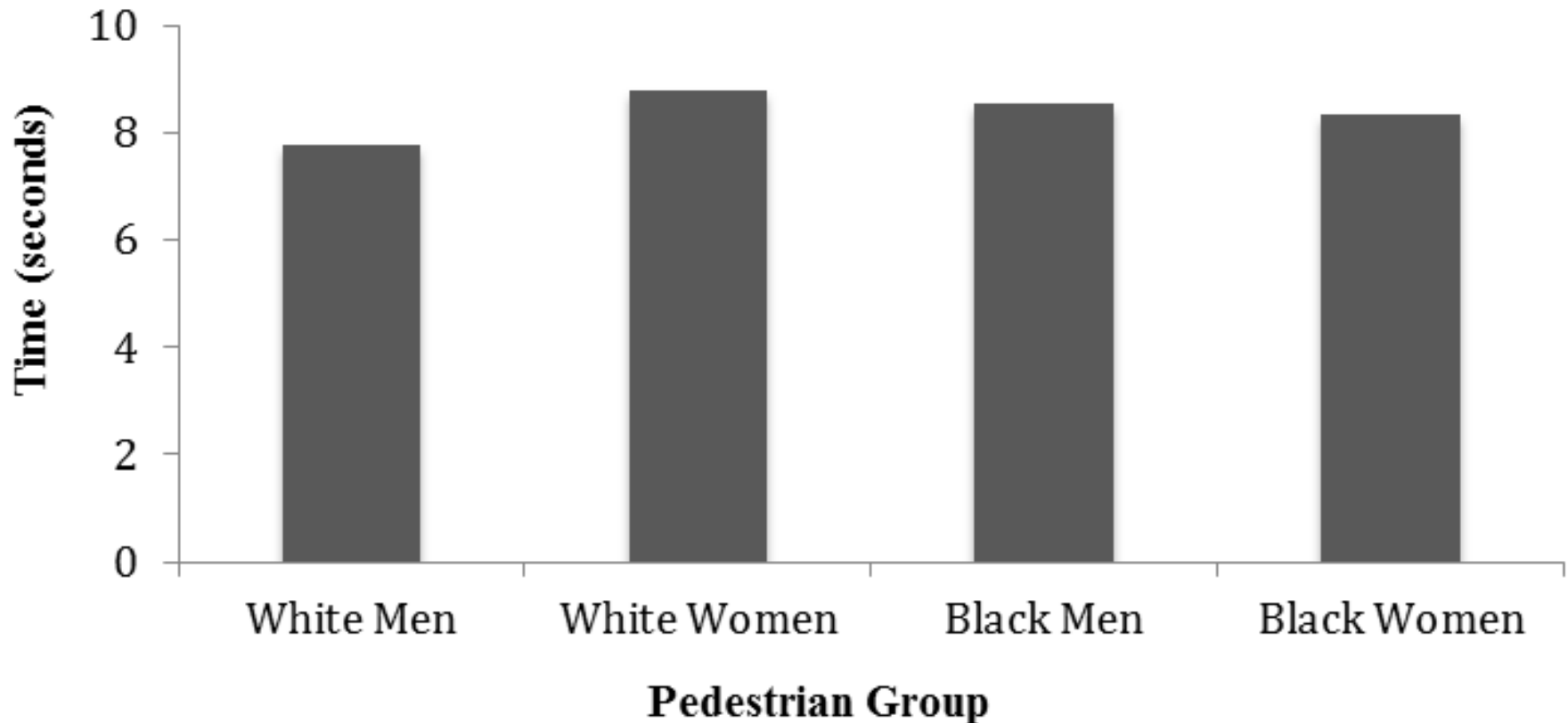
## Cars Passing Without Yielding (marked crosswalk)



- 396 trials where a car stopped
- 2x2 ANOVA , Race\*Gender interaction:  $F(1, 373) = 2.99, p=.09$
- Black men ( $M=2.05, SD=3.10$ ) being passed by nearly twice as many cars as the Black woman ( $M=1.19, SD=1.43$ ),  $t(128.59) = -2.30, p=.02$ .

# Results: Phase 2, Trial length

## Trial Length (marked crosswalk)



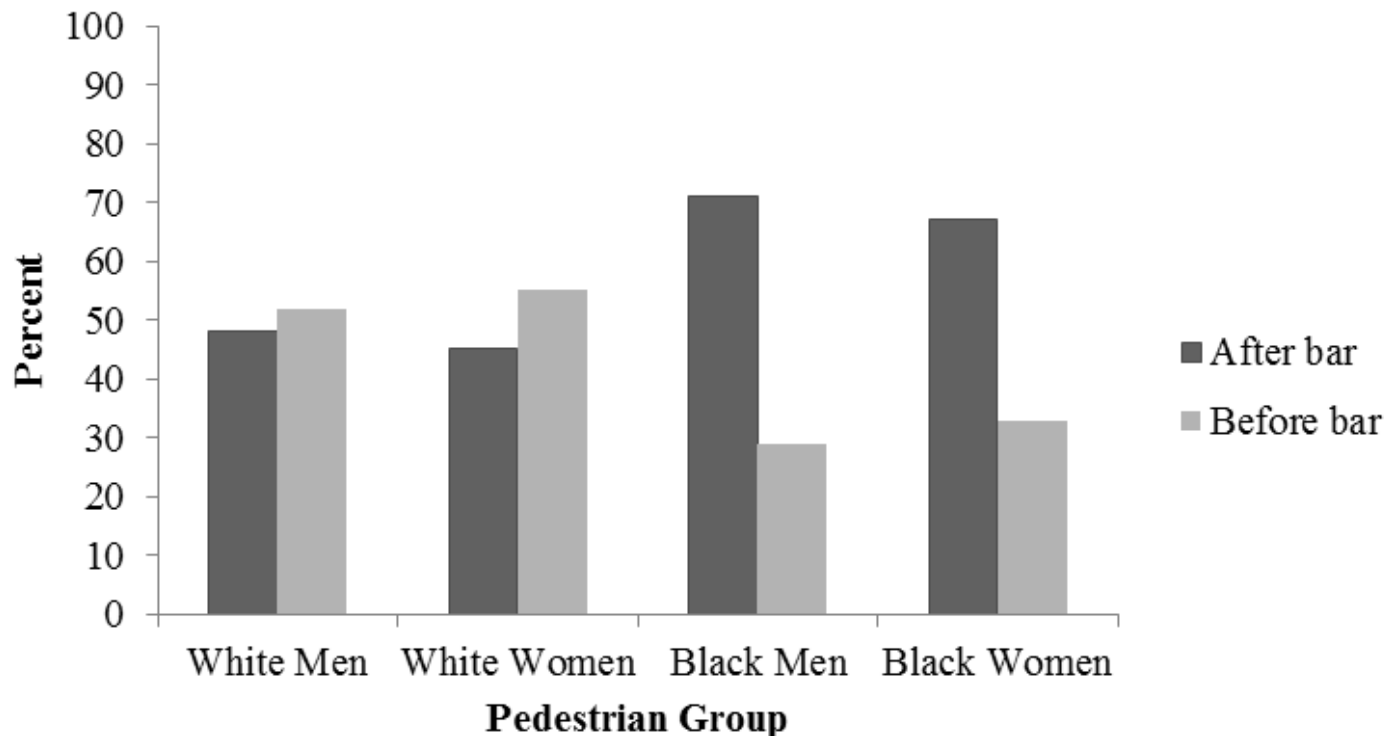
- 2x2 ANOVA , all *ns*

# Results: Phase 2, Driver characteristics of car that stopped

- 396 drivers who stopped:
  - Gender: 227 males, 124 females, 45 unknown
  - Race: 250 White, 34 nonwhite, 112 unknown
- Driver gender,  $\chi^2(2, N=309) = .09, p=.96$  and driver race,  $\chi^2(2, N=253) = .44, p=.81$ , did not predict which pedestrian groups were yielded to

# Results: Phase 2, Stop bar

## Stop bar (marked crosswalk)



- $\chi^2(3, N=381) = 21.56, p < .001$
- Black males and Black females: more likely to stop *after* bar
- White females and White females: more like to stop *before* bar

# Phase 2 Conclusions

- Marked crosswalk led to increased stopping for pedestrians, but less equitable treatment
- Race and gender differences emerged for whether first car stopped, number of cars passed, and stopping positioning
- Black and male pedestrians were less likely to have first car stop
  - Black men more likely to have more cars pass
- Drivers stopped closer to Black pedestrians
  - Intrusion into crossing space

# Field Experiment Conclusions

- Field experiments provide causal evidence of racial and gender disparities at crosswalks
- Marked crosswalk successful in increasing compliance, but did so unequally
  - Black pedestrians disadvantaged
  - Potential safety concerns
  - May lead to avoidance of walking
- Pattern consistent with implicit bias
- Role of driver discretion

# Focus Groups

- 3 focus groups examined Black and African Americans' lived experiences as pedestrians in Portland
- Recruitment through flyers, emails, listserves in Portland
- 12 Black/African American participants:
  - 10 females, 1 male, 1 trans male
  - Age: 20 to 46 (avg: 29 yrs)
  - Lived in Portland 4-27 years (avg: 16 yrs)
  - Walk avg 12 hours per week

# Focus Groups

## Focus group guide:

- Began with questions about experiences walking in Portland
  - Positive and negative
- Questions narrowed to areas of research interest, specifically drivers' yielding behavior and perceptions of bias.
  - Final questions shared information from field study and allowed Ps to respond



# Results: Focus group themes

- Participants reported that their interactions with drivers were perceived to be affected by race.

*“I will come to an intersection on one side and waiting because there’s cars, and then as soon as a white person steps on the other side, oh, car stops. I’m like, this is magic, what’s going on? It was you. It wasn’t me.”*

## Results: Focus group themes

*"When I had a white partner they would stop a lot more often than when I was by myself or with a black person. So, yes, race has something to do with it. They don't see us like human beings like they are. They think that we're second-class citizens, so when I'm crossing the street I do see a lot more negative experiences and they don't want to be inconvenienced or stop when they are supposed to. That's why we always get hit and they get upset."*

## Results: Focus group themes

*"I think that there's this, you know, understanding of that for drivers especially, like, white drivers, white male drivers and there's this kind of subconscious, like, this person isn't important, so I can rush them through while they are trying to cross the street or whatever. You know, I don't have to be as, like, attentive or whatever. And it's probably not something that they actually acknowledge, but it happens all the time."*

# Results: Focus group themes

Others talked about infringement into the crossing space and the frustration it causes:

*“I think for me, it’s because of how these things intersect with our identities, mine’s and whoever it is doing it to me. I think the most irritating one is when cars are, like, in the crosswalk and then like they will like roll down their window and say, my God, I’m sorry. I’m so sorry. I’m so sorry. And I’m like looking at them if you were sorry you wouldn’t be rolling down your window, you would be hitting reverse...”*

# Results: Focus group themes

*"Especially, like, when you are stopping in the crosswalk, that's inconvenience. You were trying to rush across the street. And when I got hit by a car, they were rushing to go pick up somebody. And it was, like, oh, so my life wasn't valuable, and you just hit me. So, yeah, I'm inconvenienced or disrespected."*

*"I know when cars are in the crosswalk, it pisses me off, like, when you say you touch their car. I will get close and look at you."*

# Results: Focus group themes

Participants noted the stress caused by these racially charged interactions.

*"I think it's stressful. It's just an added stress to your commute whenever—even when it's a leisurely commute. Stuff like that it's, like, you just have to, you know, I guess, just part of the black experience of being more aware and cautious of everything that we do."*

# Results: Focus group themes

These experiences can lead to changes in behavior.

*" I always think about it... I don't want conflict. I don't like conflict. So I, like, submit and run across the street and get out of their way. I shouldn't have to do that. I have the right-of-way. I have the light. It's my turn to walk. You know the traffic rules."*



# Results: Focus group themes

When told of the study findings, participants agreed that this matched their experiences

*"You could have asked black people and black people would have told you yes."*



# Results: Focus group themes

While the majority of discussion was on negative experiences, there were positive thoughts shared, particularly about being a pedestrian in Portland.

*“Even though I had some negative experiences, I would say that, like, Portland for me is one of the best cities to walk in. Like, I have lived and visited other places and it’s, you know, despite some of these negative experiences, it’s still one of the best.”*

# Focus groups conclusions

- Results from focus groups consistent with field experiment findings
- Majority of discussion on negative experiences, which are salient and frequent
- Race often brought up on own
- Appreciation of Portland's infrastructure for pedestrians
  - Doubtful it would help equitable treatment

# Overall recommendations

- Marking crosswalks effective in increasing stopping
  - But also unequitable stopping
- Reducing perceived discretion in stopping can increase stopping rates for all pedestrians
  - Additional signage, flashing lights
- Media campaigns and awareness
- Consider equity impact in planning

# Future Directions

- Multi method approach
- Expand beyond Portland
- Other racial minority groups
- Additional locations/neighborhoods
- Effect of disparate yielding on hitting and injuring pedestrians
- Role of increased signage on equitable stopping, different forms of infrastructure
- Causal role of implicit attitudes
- Interventions

# Thank you!

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