

# PASSENGER-TO-PASSENGER DISCRIMINATORY ATTITUDES AND THEIR ASSOCIATION WITH RIDESHARING BEHAVIOR

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January 15, 2019



*Physical, digital, and financial access to shared transport services are valuable public goods and need thoughtful design to ensure use is possible and affordable by all ages, genders, incomes, and abilities.*

- Shared Mobility Principals for Livable Cities

# Data

- 2016 Survey of ridesharing users (N=1015)
- 2018 Survey of ridesharing users (N=1026)
- Mechanical Turk
- Self-reported discriminatory attitudes

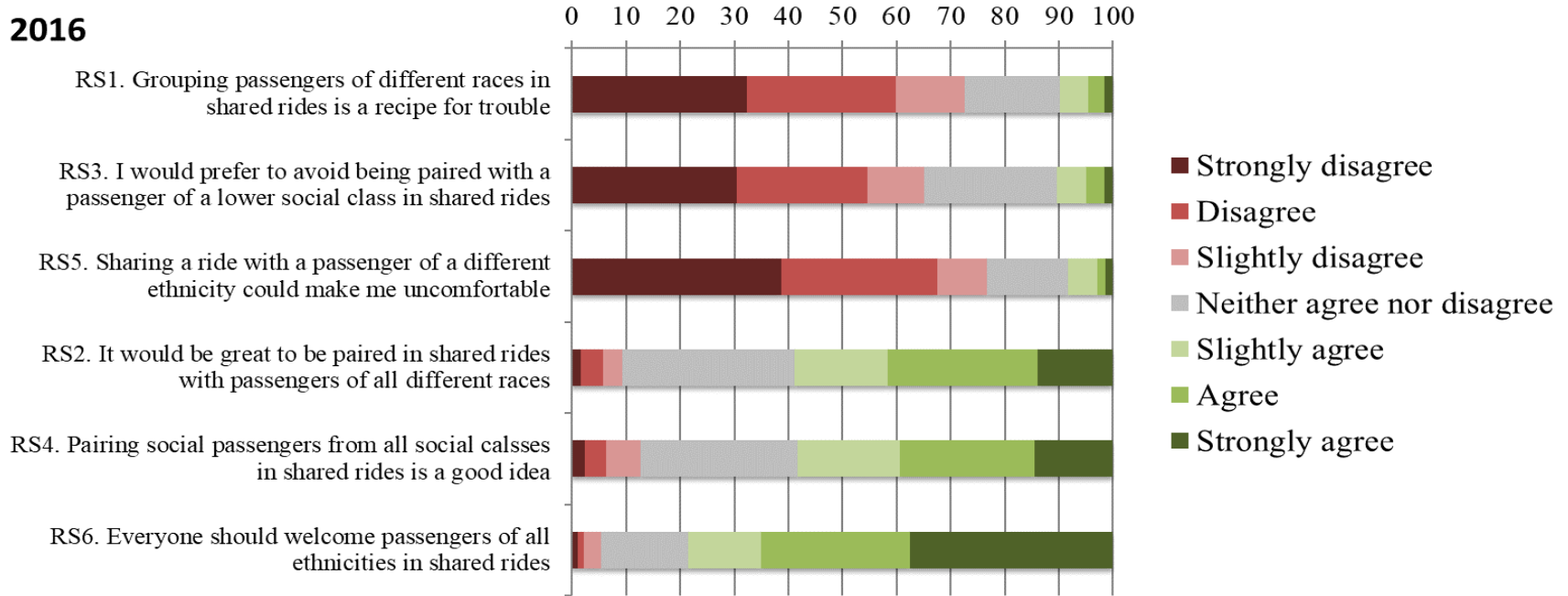
# Descriptive Statistics

Characteristic	Study Samples		NHTS
	2016	2018	2017
Male	58.6	53.7	52.3*
<u>Age</u>			
18-24	28.1	12.5	17.1*
25-34	50.4	53.0	35.1*
35-44	15.8	21.2	21.4*
45-54	3.8	7.5	13.5*
55 and older	1.9	5.8	12.8*
<u>Race/Ethnicity</u>			
White	70.0	64.2	71.5
Black	8.5	9.7	10.6
Asian	10.2	12.7	8.4
Hispanic	7.8	6.7	18.2

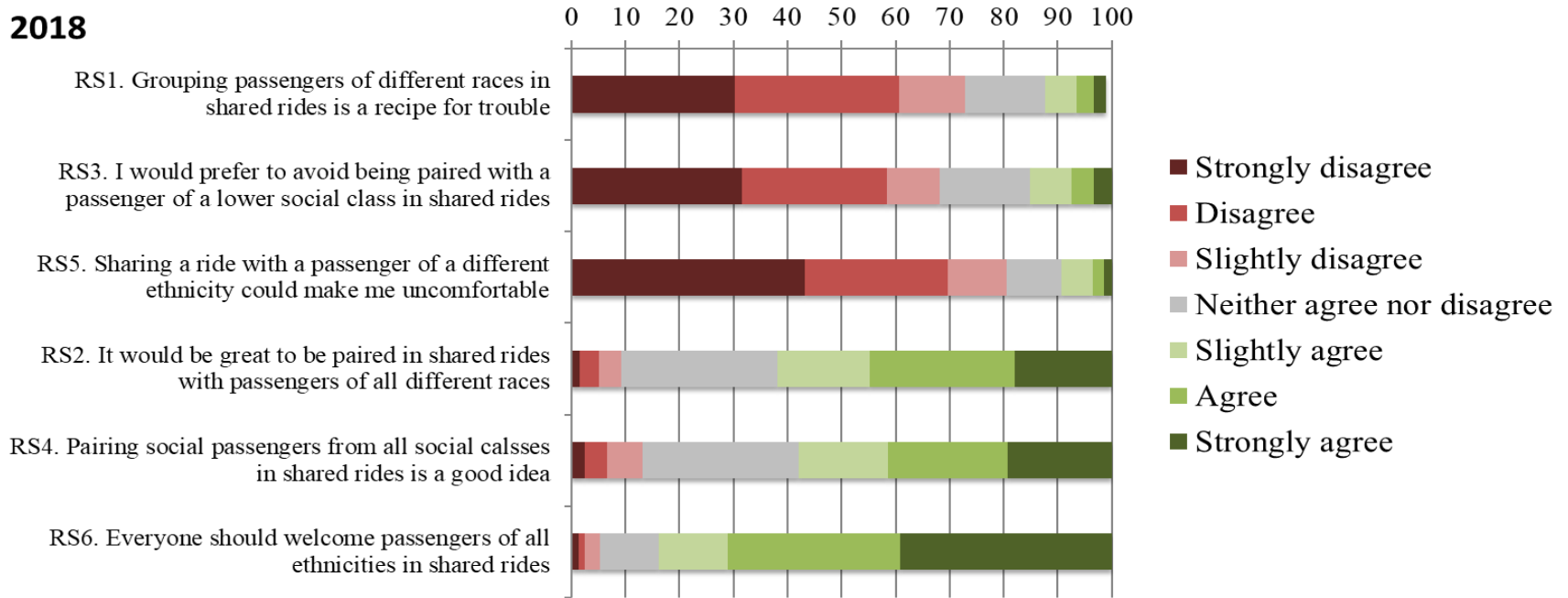
Characteristic	Study Samples		NHTS
	2016	2018	2017
<u>Income</u>			
Less than \$35,000	21.1	18.6	16.3
\$35,000 to \$74,999	49.3	47.4	21.1
\$75,000 to \$149,999	23.1	28.0	33.0
\$150,000 or more	6.5	6.0	28.1
<u>Educational Attainment</u>			
HS education	6.6	6.5	8.2
Some college	28.3	24.9	20.8
College degree	48.0	49.4	36.8
Graduate degree	17.1	18.4	32.5
<u>Employment Status</u>			
Unemployed	6.4	6.8	--
Student	12.9	4.8	--
Uses sharing	75.5	74.2	--
Sharing available in home zip code	64.7	63.5	--

Note: \* = missing data imputed by NHTS; -- = not available

2016



**2018**



# Data Cleaning

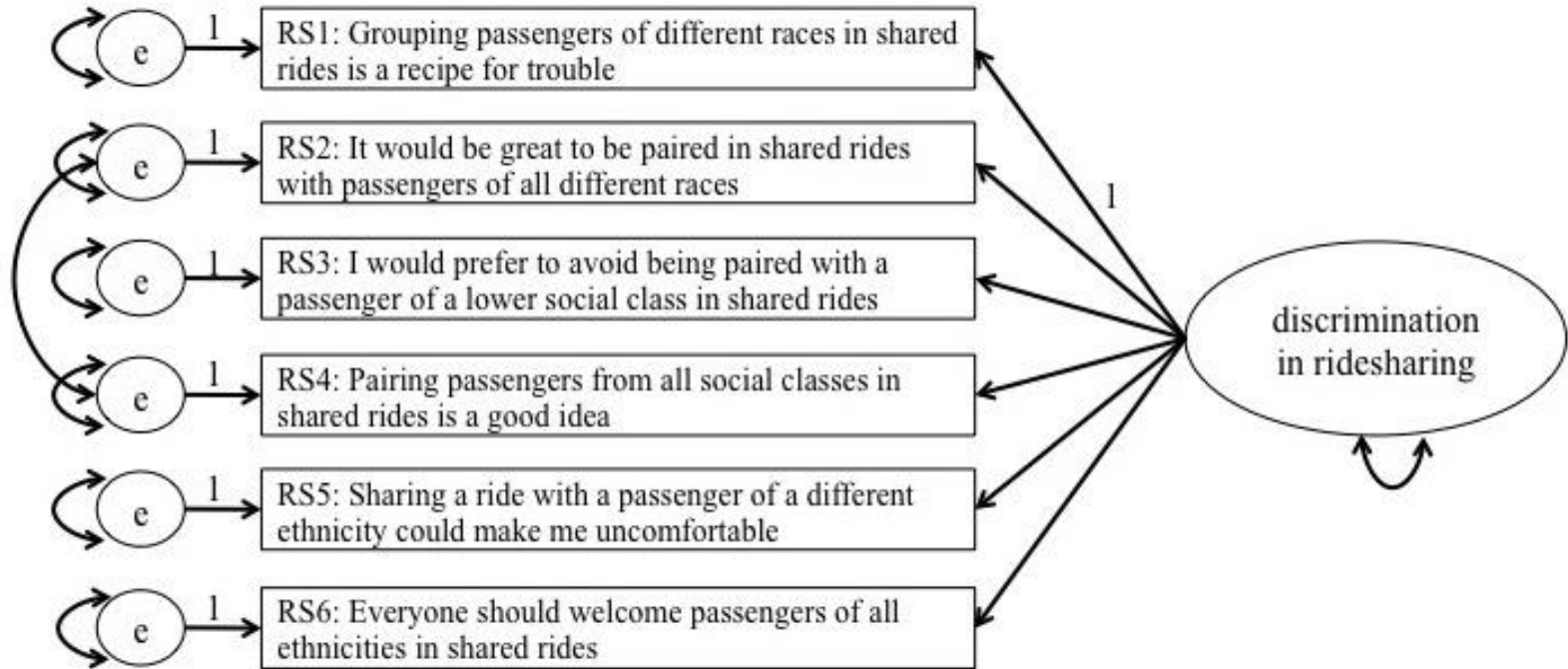
- Completion time ( $< 3.5$  min / 5<sup>th</sup> percentile)
- Shared trips  $>$  total trips
- Inconsistent ridesharing/AV preferences
- Inconsistent social dominance orientation preferences
- Pool availability

# MEASUREMENT MODELS



# Confirmatory Factor Analysis #1

Question: Can we establish a reliable measure of discriminatory attitudes in ridesharing?

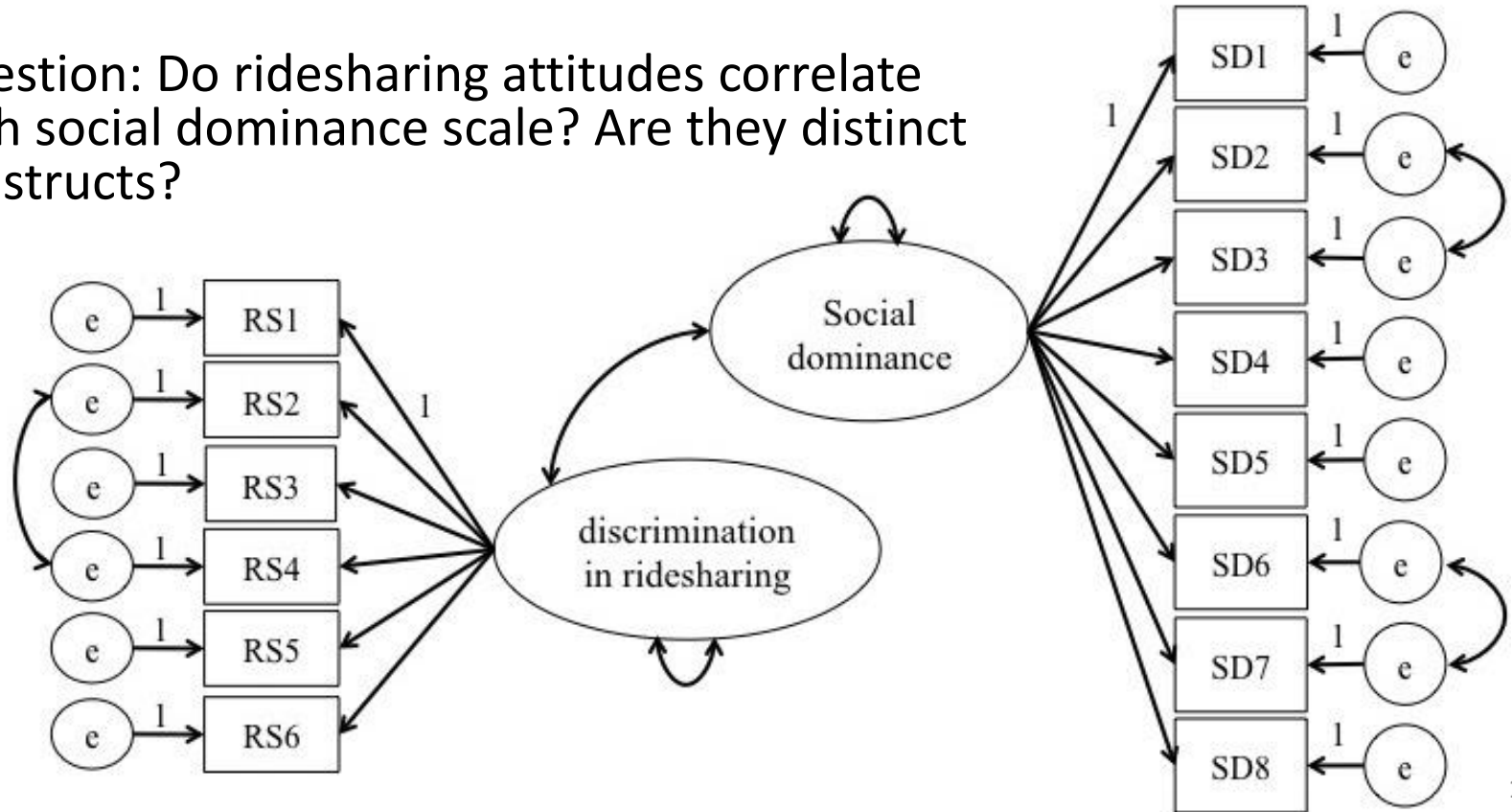


# Confirmatory Factor Analysis #1

- Overall model fit:
  - Chi-square not statistically different from zero
  - CFI and TLI > 0.90
  - RMSEA and SRMR < 0.08
- Convergent validity: majority of the variation in item responses explained by the latent construct
  - Standardized factor loadings > 0.7 and  $R^2$  values > 0.50

# Confirmatory Factor Analysis #2

Question: Do ridesharing attitudes correlate with social dominance scale? Are they distinct constructs?



# Confirmatory Factor Analysis #2

- Discriminant validity:  $\beta = 0.615$ 
  - Positive correlation between ridesharing measure with social dominance scale factors.
  - Moderate in magnitude and statistically significant
- Suggests the discrimination in ridesharing factor, while related to the social dominance scale, captures discriminatory attitudes specific to the ridesharing context

# **BEHAVIORAL MODELS**

	Dependent variable(s)	Descriptive statistics	Respondents
Model 1	Have you ever used uberPOOL or Lyft Line? (0/1)	Mean = 0.748	All ( $N = 2,041$ )
Model 2	Percentage of TNC trips that are shared in the past month (0-100%)	1st quartile = 10.0 Median = 28.0 Mean = 37.1 3 <sup>rd</sup> quartile = 55.0	Those who have shared ( $n = 1,527$ )
	Satisfaction with shared trips (0-10)	1st quartile = 6.0 Median = 7.0 Mean = 7.2 3 <sup>rd</sup> quartile = 8.5	
Model 3	Would you share in the future? (0/1)	Mean = 0.531	Those who have not shared ( $n = 514$ )

Individual-level sociodemographics:

- Age (yrs)
- Male (0/1)
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- Student (0/1)
- Unemployed (0/1)
- Single (0/1)
- Has children (0/1)
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

Number of TNC trips in last 30 days

Survey year (2016)

Ridesharing available in home ZIP code (0/1)

rider-to-rider discrimination

social dominance

Uses Sharing (0/1)

N = 2,041

Individual-level sociodemographics:

- **Age (yrs)**
- Male (0/1)
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- **Student (0/1)**
- **Unemployed (0/1)**
- Single (0/1)
- Has children (0/1)
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

**Number of TNC trips in last 30 days**

Survey year (2016)

**Ridesharing available in home ZIP code (0/1)**

~~rider-to-rider discrimination~~

**social dominance**

Uses Sharing (0/1)

N = 2,041



# Behavioral Model #1: Use

- Discriminatory attitude in ridesharing does not predict whether an individual uses ridesharing
- Positive association between more TNC trips and use of ridesharing ( $\beta = 0.191, p = .000$ )
- Positive association between availability of sharing in home zip code and use of ridesharing ( $\beta = 0.152, p = .000$ )

Individual-level sociodemographics:

- Age (yrs)
- Male (0/1)
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- Student (0/1)
- Unemployed (0/1)
- Single (0/1)
- Has children (0/1)
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

Number of TNC trips in last 30 days

Survey year (2016)

Ridesharing available in home zipcode (0/1)

*Of those who share...*

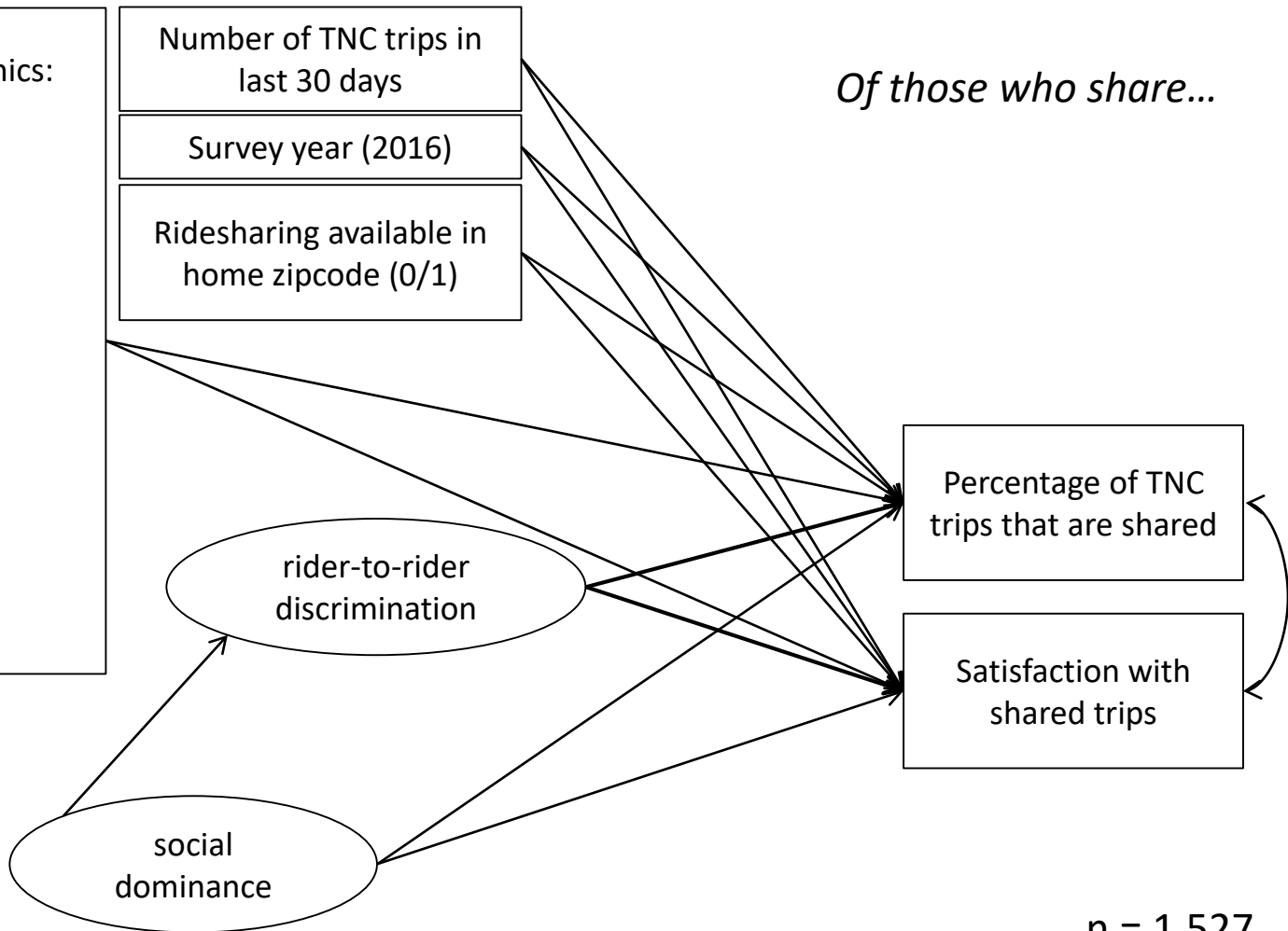
Percentage of TNC trips that are shared

Satisfaction with shared trips

rider-to-rider discrimination

social dominance

n = 1,527



Individual-level sociodemographics:

- Age (yrs)
- Male (0/1)
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- Student (0/1)
- Unemployed (0/1)
- Single (0/1)
- Has children (0/1)
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

Number of TNC trips in last 30 days

Survey year (2016)

Ridesharing available in home zipcode (0/1)

*Of those who share...*

$\beta = -0.043$   
( $p = .112$ )

rider-to-rider discrimination

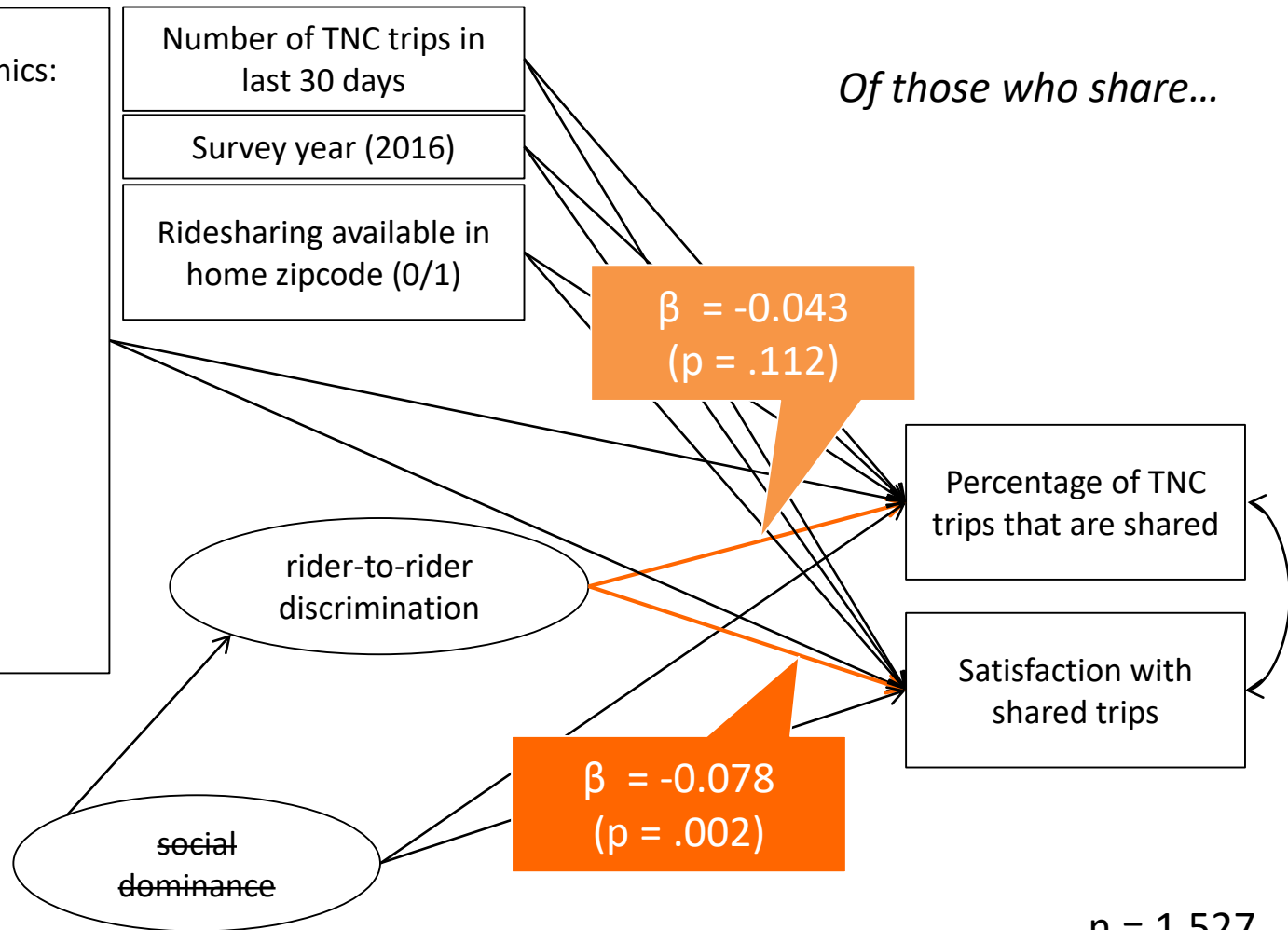
Percentage of TNC trips that are shared

Satisfaction with shared trips

$\beta = -0.078$   
( $p = .002$ )

social dominance

n = 1,527



# Behavioral Model #2: % of Trips

- Percentage of trips shared *negatively* correlated with:
  - Discriminatory attitude in ridesharing – only marginally significant
  - Survey year (2016)
- Percentage of trips shared *positively* correlated with:
  - Student (0/1)
  - Graduate degree (0/1)
  - Asian (0/1)
  - Single (0/1)
  - Number of total trips in last 30 days
  - Sharing availability in home zip code

# Behavioral Model #2: Satisfaction

- Satisfaction with sharing (1-10) *negatively* correlated with:
  - Discriminatory attitude in ridesharing
  - Survey year (2016)
  - Income
- Satisfaction with sharing (1-10) *positively* correlated with:
  - Asian (0/1)
  - Overall satisfaction with TNC trips (1-10)

*Of those who do not share...*

Individual-level sociodemographics:

- Age (yrs)
- Male (0/1)
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- Student (0/1)
- Unemployed (0/1)
- Single (0/1)
- Has children (0/1)
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

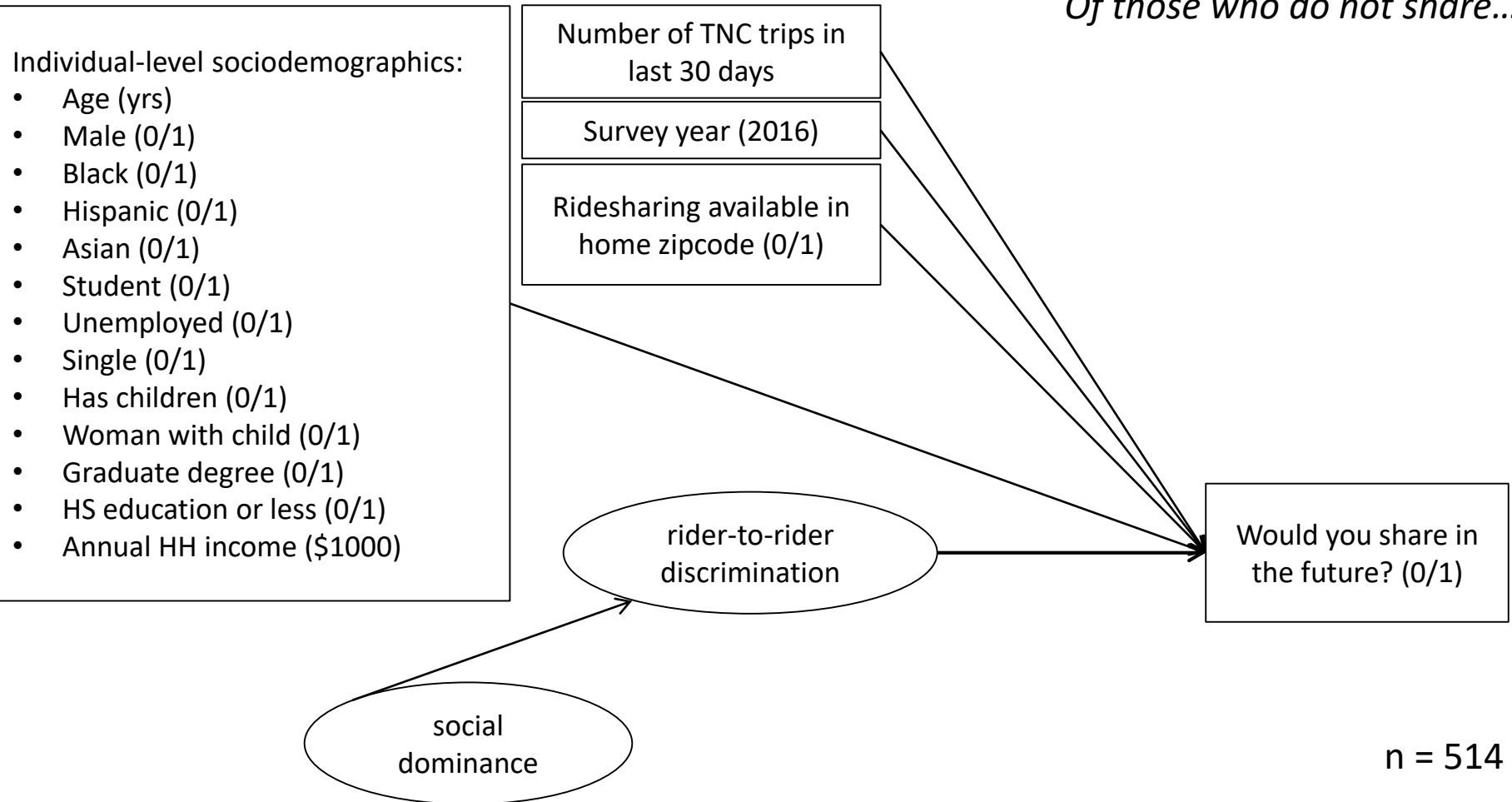
- Number of TNC trips in last 30 days
- Survey year (2016)
- Ridesharing available in home zipcode (0/1)

rider-to-rider discrimination

social dominance

Would you share in the future? (0/1)

n = 514



*Of those who do not share...*

Individual-level sociodemographics:

- Age (yrs)
- **Male (0/1)**
- Black (0/1)
- Hispanic (0/1)
- Asian (0/1)
- Student (0/1)
- Unemployed (0/1)
- Single (0/1)
- **Has children (0/1)**
- Woman with child (0/1)
- Graduate degree (0/1)
- HS education or less (0/1)
- Annual HH income (\$1000)

- Number of TNC trips in last 30 days
- Survey year (2016)**
- Ridesharing available in home zipcode (0/1)

$\beta = -0.252$   
( $p < .01$ )  
log-odds = 0.657

rider-to-rider discrimination

Would you share in the future? (0/1)

social dominance

n = 514

# Behavioral Model #3: Future Use

- Negative correlation between discriminatory attitudes in ridesharing and the willingness to consider using UberPool or Lyft Line in the future



# Conclusions

- There is no significant difference between the factor structure or the average discriminatory attitudes reported in 2016 and 2018
- Discriminatory attitudes are not predictive of whether users choose to use the sharing option...
- BUT discriminatory attitudes discourage sustained and frequent user of sharing in two ways

# Conclusions

- Among riders who use POOL/Line:
  - Discriminatory attitudes *are* marginally predictive of a lower share of shared TNC trips
  - Discriminatory attitudes *are* predictive of a lower level of satisfaction with shared trips
- Among riders who do not use POOL/Line: discriminatory attitudes are predictive of reluctance to share in the future
- These structural relations do not differ from 2016 to 2018

# Limitations

- Cross sectional data
- Omitted variables – travel time (including sharing detour), cost, etc.
- Self-reported explicit measures

## **APPENDIX: SURVEY YEARS, MODERATION**

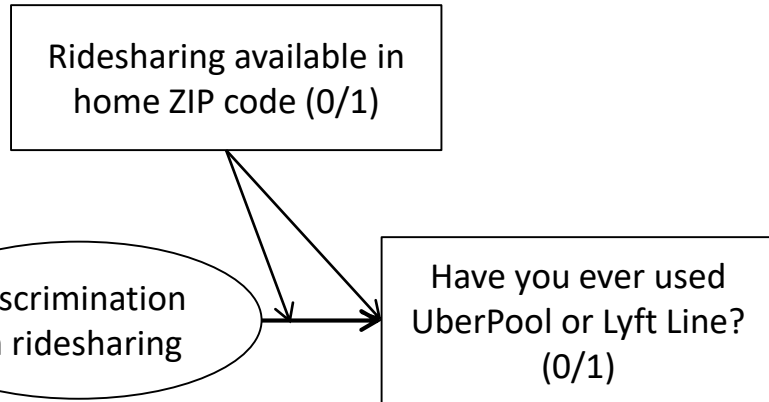
# Comparing 2016 to 2018

- Question: Is there a significant difference in the structure of the discrimination measure between the 2016 and 2018 survey implementations?
- Results:
  - Multigroup CFA model allows estimated parameters to differ between years
  - Satorra-Bentler scaled  $\chi^2$  difference test to determine whether there is better fit between the model assuming the same factor structure across survey years and the unconstrained model allowing the two years to differ
  - Structure of the discrimination in ridesharing invariant across samples

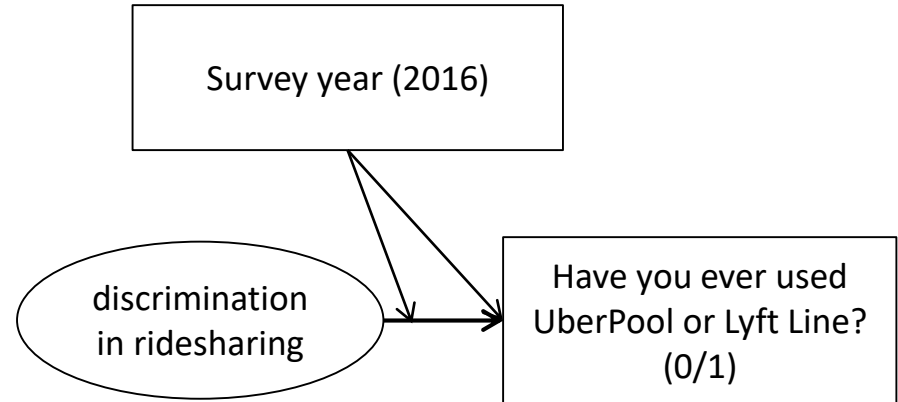
# Comparing 2016 to 2018

- 2016 mean = 0.03
- 2018 mean = -0.03
- Welch two sample t-test finds no statistical difference in the means across the two survey years
- Not only is the factor structure invariant across the two survey years, so is the average discriminatory attitude in ridesharing

# Behavioral Model #1: Moderation



Moderation:  $\beta = -0.077, p = .011$   
Discrimination:  $\beta = 0.091, p = .094$



Moderation:  $\beta = -0.012, p = .686$   
Discrimination:  $\beta = 0.013, p = .798$

# Behavioral Model #2: Moderation

- Moderation model suggests that the structural relations between ridesharing discrimination and 1) percentage of TNC trips that are shared and 2) satisfaction with sharing do not vary across survey year