

SUPPLEMENTAL MATERIALS

ASCE OPEN: Multidisciplinary Journal of Civil Engineering

Informing Just Design with Place-Based Racial History

Bethany Gordon, Liz Kraisinger, and Leidy Klotz

DOI: 10.1061/AOMJAH.AOENG-0002

© ASCE 2023

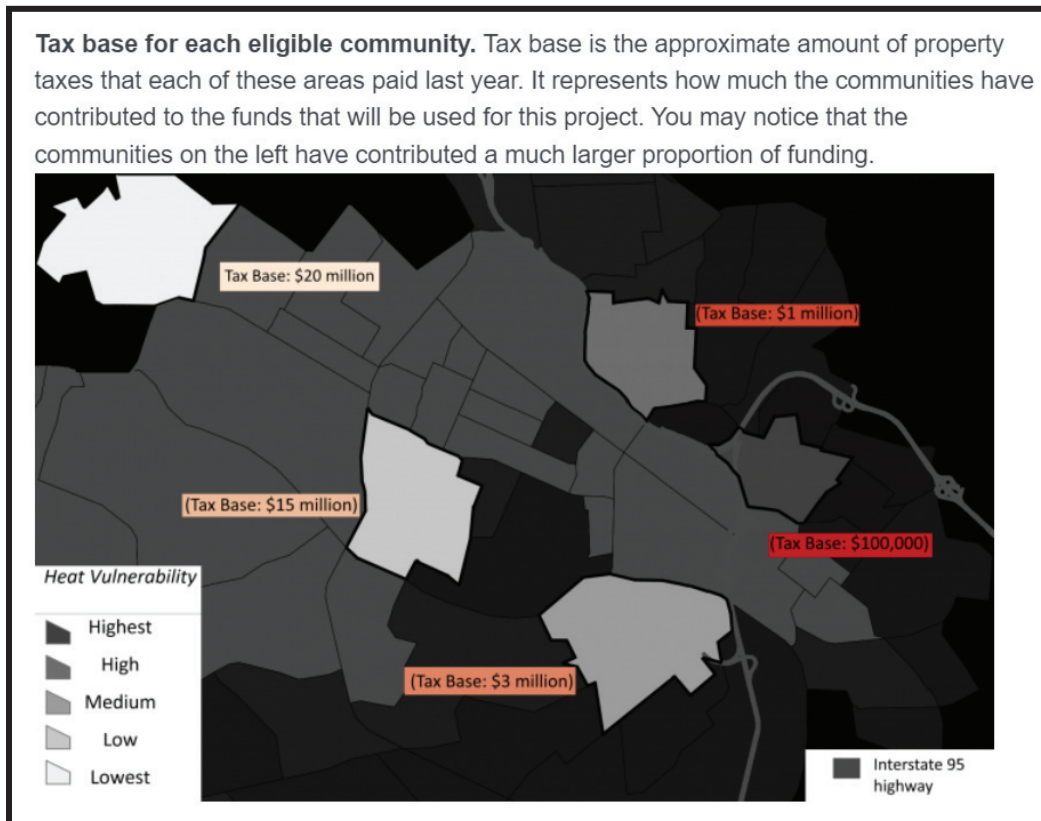
www.ascelibrary.org

1. Study Materials

Independent Variable

The videos are available at the following link: <https://osf.io/jt5rm>.

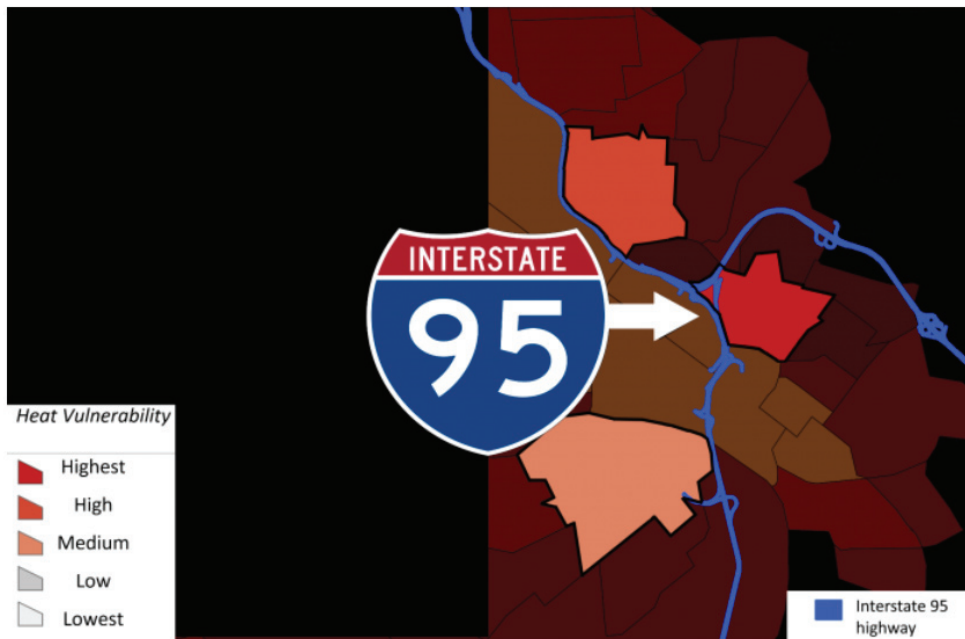
Tutorial (randomized order)



Heat vulnerability. You may have noticed that the darker red indicates that a community is currently more at risk from extreme temperatures than the lighter red communities.



The highway. The I-95 highway is the blue line that sits near some of the communities. It contributes to heat vulnerability.



Relevance

Some previous participants found the following factors to be important in determining which options to support or oppose. How relevant (if at all) were the following factors to you in deciding how to distribute resources for this project?

	Completely irrelevant 0	Somewhat irrelevant 1	Somewhat relevant 2	Completely relevant 3
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current heat vulnerability levels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Where you imagined yourself living in this scenario	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much you typically pay in property taxes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General history	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Socio-economic status	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please select Somewhat relevant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Racial history	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Completely irrelevant 0	Somewhat irrelevant 1	Somewhat relevant 2	Completely relevant 3



2. Demographics, Data Analysis Notes, and Exploratory Results

Demographics

Table B1. Full socio-demographic characteristics of the sample

	Control (N=831)	Intervention (N=900)	Overall (N=1,731)
Gender			
Man	403 (48.5%)	431 (47.9%)	834 (48.2%)
Woman	416 (50.1%)	462 (51.3%)	878 (50.7%)
Non-binary	8 (1.0%)	4 (0.4%)	12 (0.7%)
An unlisted option	2 (0.2%)	0 (0%)	2 (0.1%)
Prefer not to say	2 (0.2%)	3 (0.3%)	5 (0.3%)
Age (years)			
18-24	48 (5.8%)	48 (5.3%)	96 (5.5%)
25-34	234 (28.2%)	250 (27.8%)	484 (28.0%)
35-44	225 (27.1%)	224 (24.9%)	449 (25.9%)
45-54	152 (18.3%)	180 (20.0%)	332 (19.2%)
55-64	103 (12.4%)	133 (14.8%)	236 (13.6%)
65+	67 (8.1%)	62 (6.9%)	129 (7.5%)
Prefer not to say	2 (0.2%)	3 (0.3%)	5 (0.3%)
Education			
Some high school	3 (0.4%)	4 (0.4%)	7 (0.4%)
High school diploma	73 (8.8%)	91 (10.1%)	164 (9.5%)
Some college	172 (20.7%)	175 (19.4%)	347 (20.0%)
Associate Degree	84 (10.1%)	99 (11.0%)	183 (10.6%)
Bachelor's Degree	326 (39.2%)	358 (39.8%)	684 (39.5%)

Master's Degree	140 (16.8%)	126 (14.0%)	266 (15.4%)
PhD	17 (2.0%)	24 (2.7%)	41 (2.4%)
Professional Degree	14 (1.7%)	20 (2.2%)	34 (2.0%)
Missing	2 (0.2%)	3 (0.3%)	5 (0.3%)

Race¹

Black	83 (10.0%)	88 (9.8%)	171 (9.9%)
White	674 (81.1%)	722 (80.2%)	1396 (80.6%)
Asian	65 (7.8%)	75 (8.3%)	140 (8.1%)
Indigenous American	11 (1.3%)	16 (1.8%)	27 (1.6%)
Pacific Islander	1 (0.1%)	5 (0.6%)	6 (0.3%)
Other	25 (3.0%)	20 (2.2%)	45 (2.6%)
Missing	2 (0.2%)	2 (0.2%)	4 (0.2%)

Ethnicity

Hispanic	23 (2.8%)	21 (2.3%)	44 (2.5%)
Latine	13 (1.6%)	23 (2.6%)	36 (2.1%)
Spanish	16 (1.9%)	5 (0.6%)	21 (1.2%)
Multiple Selected	9 (1.1%)	8 (0.9%)	17 (1.0%)
None of the Above	768 (92.4%)	840 (93.3%)	1608 (92.9%)

Political Orientation

Extremely Liberal	92 (11.1%)	103 (11.4%)	195 (11.3%)
Liberal	198 (23.8%)	226 (25.1%)	424 (24.5%)
Slightly Liberal	116 (14%)	132 (14.7%)	248 (14.3%)
Moderate or 'Middle of the Road'	164 (19.7%)	186 (20.7%)	350 (20.2%)
Slightly Conservative	98 (11.8%)	100 (11.1%)	198 (11.4%)

¹ For items where multiple options could be selected, the counts and percentages for those categories will not add to the total.

Conservative	117 (14.1%)	110 (12.2%)	227 (13.1%)
Extremely Conservative	44 (5.3%)	39 (4.3%)	83 (4.8%)
Prefer not to say	2 (0.2%)	4 (0.4%)	6 (0.3%)
Political Party			
Republican	195 (23.5%)	186 (20.7%)	381 (22.0%)
Democrat	375 (45.1%)	387 (43%)	762 (44.0%)
Independent	212 (25.5%)	281 (31.2%)	493 (28.5%)
Libertarian	16 (1.9%)	25 (2.8%)	41 (2.4%)
Other	0 (0%)	0 (0%)	0 (0%)
Missing	33 (4.0%)	21 (2.3%)	54 (3.1%)
Income			
< \$10,000	26 (3.1%)	28 (3.1%)	54 (3.1%)
\$10,000 - \$19,999	73 (8.8%)	64 (7.1%)	137 (7.9%)
\$20,000 - \$29,999	80 (9.6%)	92 (10.2%)	172 (9.9%)
\$30,000 - \$39,999	98 (11.8%)	94 (10.4%)	192 (11.1%)
\$40,000 - \$49,999	100 (12.0%)	91 (10.1%)	191 (11.0%)
\$50,000 - \$59,999	86 (10.3%)	103 (11.4%)	189 (10.9%)
\$60,000 - \$69,999	70 (8.4%)	62 (6.9%)	132 (7.6%)
\$70,000 - \$79,999	54 (6.5%)	63 (7.0%)	117 (6.8%)
\$80,000 - \$89,999	43 (5.2%)	63 (7.0%)	106 (6.1%)
\$90,000 - \$99,999	48 (5.8%)	54 (6.0%)	102 (5.9%)
\$100,000 - \$149,999	93 (11.2%)	114 (12.7%)	207 (12.0%)
\$150,000 +	57 (6.9%)	69 (7.7%)	126 (7.3%)
Missing	3 (0.4%)	3 (0.3%)	6 (0.3%)
Geographic Region			
West	149 (17.9%)	155 (17.2%)	304 (17.6%)

Southwest	80 (9.6%)	98 (10.9%)	178 (10.3%)
Midwest	194 (23.3%)	203 (22.6%)	397 (22.9%)
Northeast	186 (22.4%)	193 (21.4%)	379 (21.9%)
Southeast	220 (26.5%)	248 (27.6%)	468 (27%)
Missing	2 (0.2%)	3 (0.3%)	5 (0.3%)

Experience with Richmond, VA (RVA)

Live in RVA	6 (0.7%)	3 (0.3%)	9 (0.5%)
Used to live in RVA	6 (0.7%)	8 (0.9%)	14 (0.8%)
Have visited RVA	143 (17.2%)	133 (14.8%)	276 (15.9%)
Have family in RVA	12 (1.4%)	11 (1.2%)	23 (1.3%)
Seen RVA in news/online	237 (28.5%)	298 (33.1%)	535 (30.9%)
Multiple Selected	85 (10.2%)	95 (10.6%)	180 (10.4%)
None of the above	330 (39.7%)	334 (37.1%)	664 (38.4%)
Other	11 (1.3%)	17 (1.9%)	28 (1.6%)
Missing	1 (0.1%)	1 (0.1%)	2 (0.1%)

Voting Habits

National & local	461 (55.5%)	533 (59.2%)	994 (57.4%)
National only	264 (31.8%)	245 (27.2%)	509 (29.4%)
Local only	9 (1.1%)	12 (1.3%)	21 (1.2%)
Ineligible to vote	7 (0.8%)	14 (1.6%)	21 (1.2%)
Choose not to vote	88 (10.6%)	93 (10.3%)	181 (10.5%)
Missing	2 (0.2%)	3 (0.3%)	5 (0.3%)

Employment Status

Full Time	452 (54.4%)	517 (57.4%)	969 (56.0%)
Part Time	118 (14.2%)	116 (12.9%)	234 (13.5%)
Self-employed	74 (8.9%)	101 (11.2%)	175 (10.1%)

Homemaker	40 (4.8%)	39 (4.3%)	79 (4.6%)
Student	22 (2.6%)	34 (3.8%)	56 (3.2%)
Unable to work	19 (2.3%)	10 (1.1%)	29 (1.7%)
Unemployed – looking for work	44 (5.3%)	47 (5.2%)	91 (5.3%)
Unemployed – not looking for work	11 (1.3%)	10 (1.1%)	21 (1.2%)
Retired	66 (7.9%)	50 (5.6%)	116 (6.7%)

Employment Field

STEM	136 (16.4%)	147 (16.3%)	283 (16.3%)
Education	76 (9.1%)	93 (10.3%)	169 (9.8%)
Government	30 (3.6%)	29 (3.2%)	59 (3.4%)
Hospitality	28 (3.4%)	36 (4.0%)	64 (3.7%)
Medicine	48 (5.8%)	58 (6.4%)	106 (6.1%)
Retail	61 (7.3%)	81 (9.0%)	142 (8.2%)
Other	184 (22.1%)	157 (17.4%)	341 (19.7%)

2019 - 2021 Race Related Behavior

Participants were asked about their behavior related to race-related national events of the past several years (Table B2).

Table B2. 2019-2021 race-related behavior

	2019			2020			2021		
	C	I	T	C	I	T	C	I	T
BLM Protest Attendance	39 (4.7)	43 (4.8)	82 (4.7)	40 (4.8)	34 (3.8)	74 (4.3)	7 (0.8)	8 (0.9)	15 (0.9)
Police Support Rally Attendance	17 (2.0)	13 (1.4)	30 (1.7)	5 (0.6)	9 (1.0)	14 (0.8)	3 (0.4)	1 (0.1)	4 (0.2)

Education About Race	338 (40.7)	399 (44.3)	737 (42.6)	110 (13.2)	123 (13.7)	233 (13.5)	25 (3.0)	14 (1.6)	39 (2.3)
Difficult Conversations About Race	316 (38.0)	398 (44.2)	714 (41.2)	94 (11.3)	109 (12.1)	203 (11.7)	30 (3.6)	22 (2.4)	52 (3.0)

Note: C=Control, I = Intervention, T=Total; N(%)

Inclusion Criteria

In total, 467 participants were excluded in some fashion from the study (Table B3). As specified in the preregistration, attention to and comprehension of the task is more important for understanding the potential of the intervention at this stage over the practical generalization to an entire population. We recognize that these stringent criteria affect the external validity of this study, but accept this limitation as a necessary factor of deploying a relatively complex design decision to an online pool of participants.

Table B3. Excluded participants

	Control N=174	Intervention N=293	Total N=467
Drop out			
Mid-video	5 (2.9%)	7 (2.4%)	12 (2.6%)
Dependent Variable	0 (0%)	2 (0.7%)	2 (0.4%)
Post Video Attention Check			
Incorrect Response	108 (62.1%)	228 (77.8%)	336 (71.9%)
Comprehension Check			
Question 1 Incorrect	14 (8.0%)	11 (3.8%)	25 (5.4%)
Question 2 Incorrect	8 (4.6%)	13 (4.4%)	21 (4.5%)
Incomplete/Drop out	19 (10.9%)	13 (4.4%)	32 (6.9%)
Self-Report			
Data Not Useful	7 (4.0%)	7 (2.4%)	14 (3.0%)

Lack of Attention	6 (3.4%)	4 (1.4%)	10 (2.1%)
Technical Difficulty	6 (3.4%)	8 (2.7%)	14 (3.0%)

Prior Knowledge of Intervention Table

The vast majority of participants had no prior knowledge of the information presented in the intervention (Table B4, Figure B1). This data is helpful because prior knowledge of the intervention content may have an unknown effect on the relationship between the independent variable and dependent variable.

Table B4. Prior knowledge of the intervention content

	Control N=831	Intervention N=900	Total N=1731
None at all	704 (84.7%)	729 (81.0%)	1433 (82.8%)
A little	80 (9.6%)	113 (12.6%)	193 (11.1%)
A moderate amount	29 (3.5%)	39 (4.3%)	68 (3.9%)
A lot	11 (1.3%)	12 (1.3%)	23 (1.3%)
A great deal	5 (0.6%)	6 (0.7%)	11 (0.6%)
Missing	2 (0.2%)	1 (0.1%)	3 (0.2%)

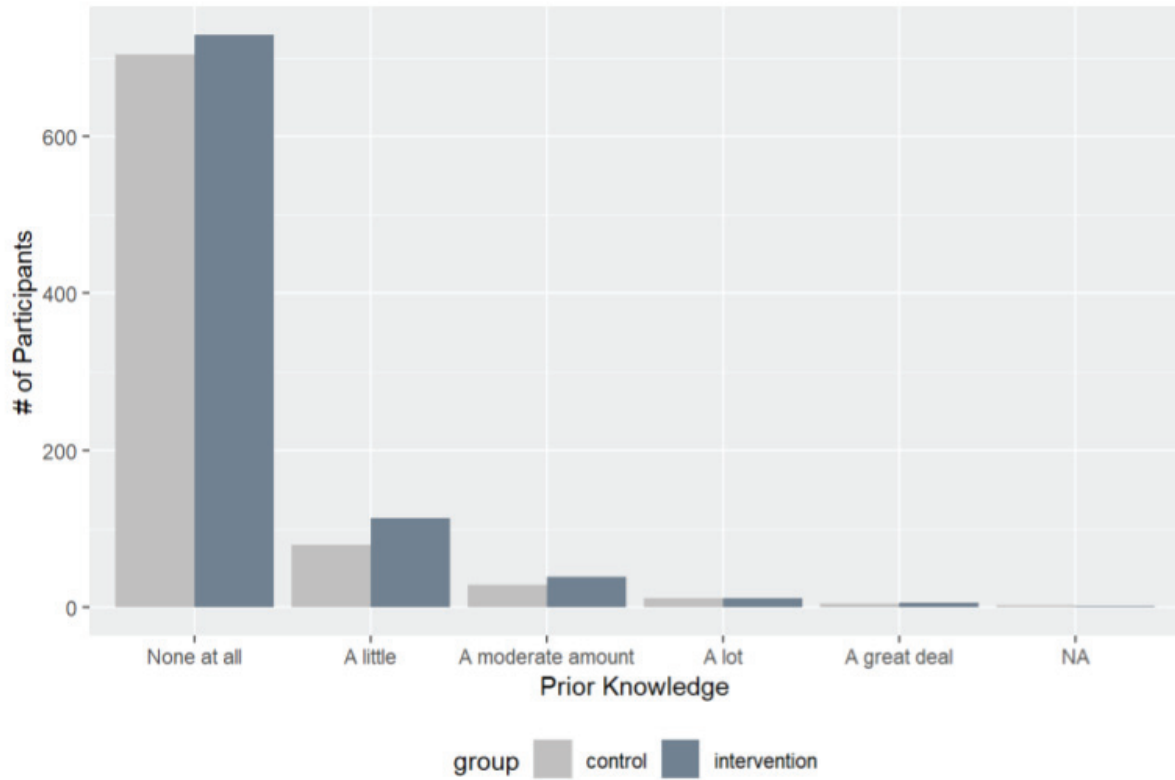


Figure B1. Self-reported knowledge of Black history presented in the intervention video prior to taking the survey

Table B5. Descriptive Statistics of the relevance of racial history questions

Relevance of racial history	N	Mean	SD	Median	Limits	
					Min	Max
Control	831	0.702	0.99	0	0	3
Intervention	900	1.169	1.08	1	0	3

Table B6. Two-sided Welch's test for relevance of racial history shows that the group differences in perceived relevance of racial history to decision-making was significantly different between the intervention and control groups

Relevance of Racial History	Intervention		Control		t	p	99% CI	
	M	SD	M	SD			LL	UL
Racial History	0.70	0.99	1.17	1.08	-9.4	0*	-0.60	-0.34

Note. 0=Completely irrelevant, 3 = Completely relevant, *p<0.01

Hypothesis Test

Though the assumptions of equal variances and equal sample sizes are not present for a Welch's test, the assumption of normality still holds. As seen in the bar graph below (Figure B2), the data does not conform to a normal distribution. However, for large sample sizes, such as the sample gathered for this study, Welch's t-test is also robust to this assumption (Rochon et al. 2012).

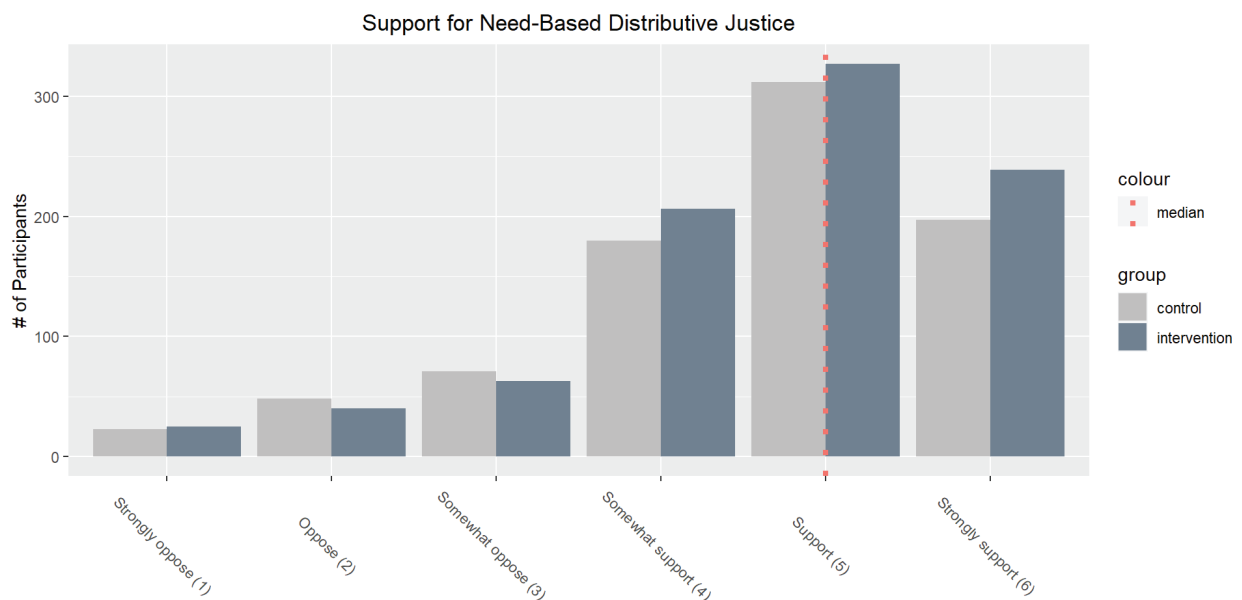


Figure B2. Bar graph of the distributions of participants responses to the dependent variable by group

The box plot below (Figure B3) does detect responses of ‘oppose’ and ‘strongly oppose’ in the control group as outliers. However, that would require the removal of 145 participants (16.6% of the control group). Due to the limited range of responses participants could select, omitting two of the six options would make the results uninterpretable.

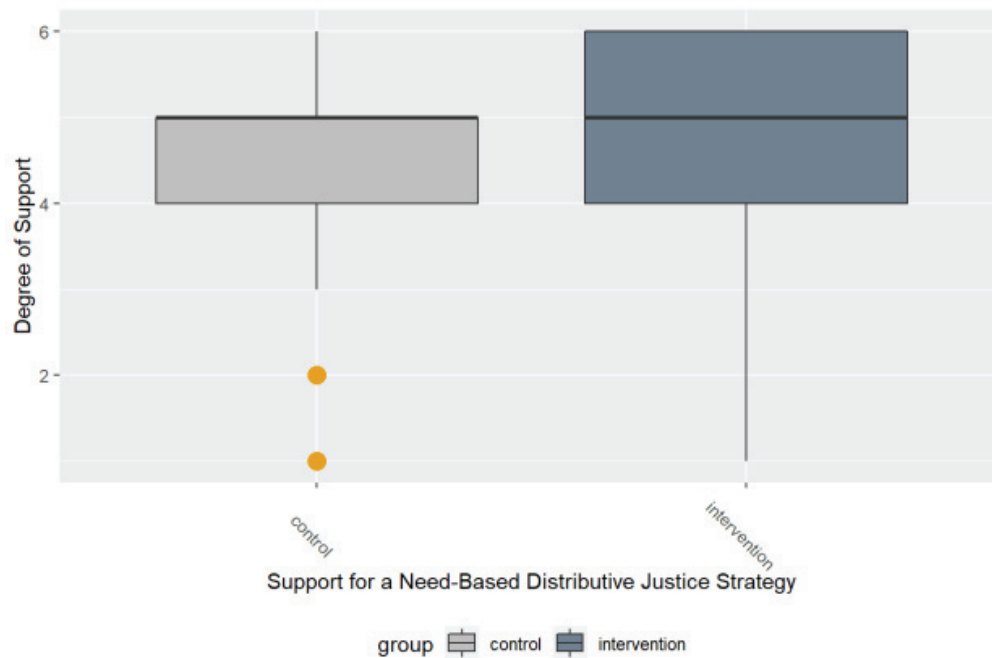


Figure B3. Boxplots for dependent variable by group

Addressing Research Quality

This work was conducted with high standards of reliability and validity in mind, with the goal of rigorous documentation to promote reproducibility. Since it is not feasible to have a measure of internal consistency with a single-item measure, this study approaches reliability by closely aligning the research question, the hypothesis, and the dependent variable measure to create a reliable outcome. This design decision limits the generalizability of the results, but was deemed a necessary trade-off given the importance of reliability to sound empirical research.

The effective range is concerned with the sensitivity of the scale. This is especially important, as single-item scales provide fewer points of discrimination and one of the reasons why a larger sample size is estimated for the actual study. This 6-point Likert scale question that measures support or opposition to need-based distributive justice did capture a range of responses and the revealed different group means in the descriptive statistics. However, the distribution of data, which is very left-skewed, could indicate a ceiling effect. This effect is also seen in the

conservative-liberal identity exploratory analysis, where participants identifying as ‘extremely liberal’ converge on the highest option (strongly support).

Content Validity was addressed by showing the study to individuals with various levels of knowledge and expertise in the subject area. In total, over 120 comments were fielded and addressed in the revision of the study as a whole, with specific focus on the dependent variable. First, 7 doctoral students in civil engineering and history looked through the study materials and all concerns were addressed. The primary feedback from those groups resulted in clarifying the context introduced in the vignette so that it does not distract from the question being asked.

Next, 16 lay people with various levels of education and types of life experience provided feedback on the clarity of the questions and the maps in the study. This is where most of the feedback from the dependent variable came into play because the previous version of the map led participants to ask for too broad a range of information, so that it was clear that the maps did not guide the participants through the core pieces of information necessary to consider the distributive justice options of equality, equity, and need.

In order to establish content validity, we kept a fairly narrow definition of what we were measuring. Earlier in the study development, the study planned to account for all three of the types of distributive justice measured in the experimental design and there were significant problems in limiting the representation of distributive justice to these three principles, even if they are the main three principles. There are also several ways in which even the narrow category of need-based distributive justice can be represented. In this study, a need-based distributive justice strategy is meant to be a representation of the construct of need-based distributive justice, but not representative of all need-based distributive justice strategies (this is made clear in the use of ‘a’ instead of ‘the’ when referring to the variable). By focusing on only one principle of distributive justice and by narrowing the context in which we are discussing that principle, the content validity of this study should be sufficiently addressed.

In addition to these pre-test checks, the pilot test participants were shown a revised version of the study materials where the context and maps were presented in the video, then clarified again in a brief tutorial before answering the dependent variable question. Participants were given the opportunity to raise concerns related to face validity. A few participants raised issues with the colors used (the darkening was a mixed bag of helpful and unhelpful) and some of them wanted more specific information about the proximity of each neighborhood to the highway. These pieces of feedback were considered, but given that the vast majority of participants found the materials to be comprehensible major changes were not made to the visuals.

Exploratory Analyses

Equality-Based Strategy

In addition to the need-based distributive justice strategy, equality and merit-based strategies were provided to participants as alternatives. Participants indicated their degree of support (or opposition) for these strategies just as they did for the dependent variable.

The descriptive statistics for the equality-based strategy (Tables B7 and B8) show that the intervention and control groups were equally neutral about this strategy. The means and medians were all 4, “somewhat support”, and the means were 3.45 ± 1.39 (control) and 3.48 ± 1.35 (intervention).

Table B7. Descriptive statistics of preferences regarding the equality-based strategy

Equality-based strategy	N	Mean	SD	Median	Limits	
					Min	Max
Control	831	3.46	1.39	4	1	6
Intervention	900	3.48	1.35	4	1	6

Table B8. Two-sided Welch's test for group differences on preferences for the equality-based strategy

	Intervention		Control		t	p	99% CI		Cohen d
	M	SD	M	SD			LL	UL	
Equality-based strategy	3.48	1.35	3.46	1.39	-0.31	0.75	-0.19	0.15	0.02

Note. 1 = Strongly oppose, 6 = Strongly support, * $p < 0.01$



Figure B4. Boxplots for equality-based strategy by group

Merit-Based Strategy

The merit-based strategy was the exact opposite of the need-based strategy for the purpose of simplicity and the result is approximately a mirror scenario of the need-based results. The medians and modes for both groups were the same, 2 and 1 respectively. The mean and standard deviation for the control group was 2.28 ± 1.28 and 2.13 ± 1.19 for the intervention group.

Table B9. Descriptive statistics of preferences regarding the merit-based strategy

	N	Mean	SD	Median	Limits	
					Min	Max
Control	831	2.28	1.28	2	1	6
Intervention	900	2.13	1.19	2	1	6

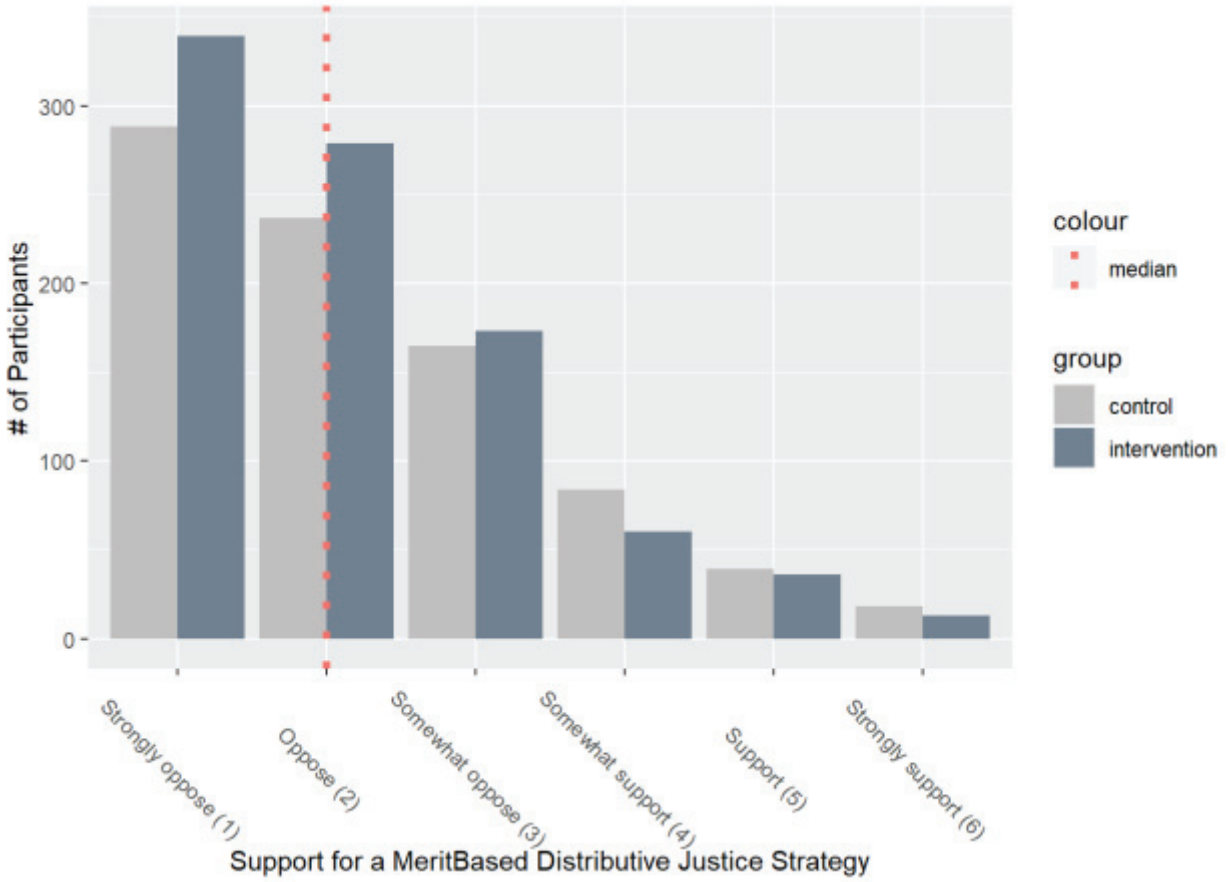


Figure B5. Distribution of responses by group regarding the merit-based strategy

Table B10. Two-sided Welch's test for group differences on preferences for the equality-based strategy

	Intervention		Control		t	p	99% CI		Cohen d
	M	SD	M	SD			LL	UL	
Merit-based strategy	2.13	1.19	2.28	1.28	2.60	0.009*	0.0014	0.308	0.13

Note. 1= Strongly oppose, 6 = Strongly support, *p<0.01

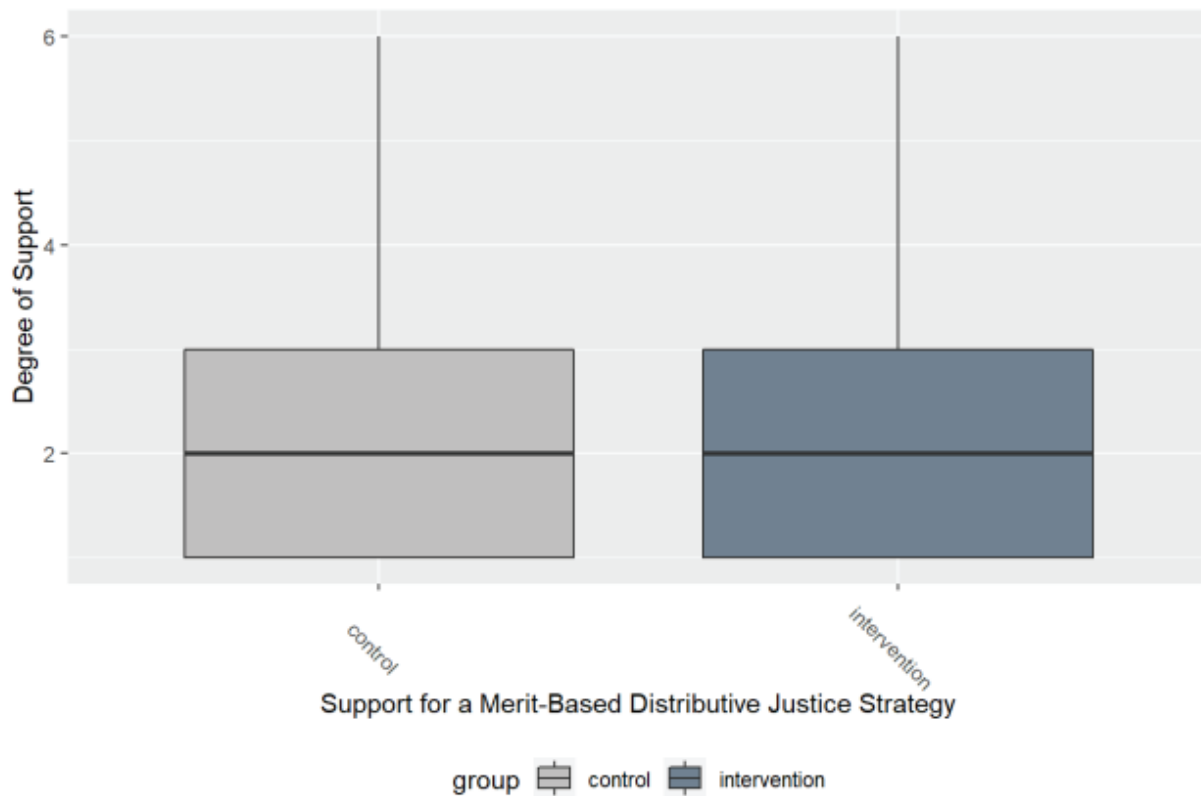


Figure B6. Boxplots for the merit-based strategy by group

Perceived Relevance Factors

As a follow-up question, we wanted to gauge how relevant participants consciously registered racial history as a factor in their decision-making process. In order to avoid desirability bias, this question was couched in a question about several relevant factors that had been identified as relevant by previous participants. The options were presented in a randomized order. Table B12 shows the count and percentage breakdown for each factor. Figure B6 helps to visualize the difference in these numbers.

Table B12. Frequency table for perceived relevance of various factors on decision-making

	Control (N=831)	Intervention (N=900)	Total (N=1731)
Racial History			
Completely irrelevant	505 (60.8%)	327 (36.3%)	832 (48.1%)

Somewhat irrelevant	133 (16.0%)	226 (25.1%)	359 (20.7%)
Somewhat relevant	129 (15.5%)	215 (23.9%)	344 (19.9%)
Completely relevant	64 (7.7%)	132 (14.7%)	196 (11.3%)
Socio-economic status			
Completely irrelevant	279 (33.6%)	272 (30.2%)	551 (31.8%)
Somewhat irrelevant	193 (23.2%)	247 (27.4%)	440 (25.4%)
Somewhat relevant	243 (29.2%)	251 (27.9%)	494 (28.5%)
Completely relevant	116 (14.0%)	130 (14.4%)	246 (14.2%)
History			
Completely irrelevant	236 (28.4%)	220 (24.4%)	456 (26.3%)
Somewhat irrelevant	206 (24.8%)	272 (30.2%)	478 (27.6%)
Somewhat relevant	308 (37.1%)	306 (34.0%)	614 (35.5%)
Completely relevant	81 (9.7%)	102 (11.3%)	183 (10.6%)
Heat vulnerability			
Completely irrelevant	20 (2.4%)	19 (2.1%)	39 (2.3%)
Somewhat irrelevant	29 (3.5%)	24 (2.7%)	53 (3.1%)
Somewhat relevant	158 (19.0%)	140 (15.6%)	298 (17.2%)
Completely relevant	624 (75.1%)	717 (79.7%)	1341 (77.5%)
Taxes			
Completely irrelevant	289 (34.8%)	322 (35.8%)	611 (35.3%)
Somewhat irrelevant	250 (30.1%)	290 (32.3%)	540 (31.2%)
Somewhat relevant	196 (23.6%)	234 (26.0%)	430 (24.8%)
Completely relevant	96 (11.6%)	54 (6.0%)	150 (8.7%)
Imagined location of residence			
Completely irrelevant	273 (32.9%)	343 (38.1%)	616 (35.6%)
Somewhat irrelevant	173 (20.8%)	157 (17.4%)	330 (19.1%)

Somewhat relevant	240 (28.9%)	269 (29.9%)	509 (29.4%)
Completely relevant	145 (17.4%)	131 (14.6%)	276 (15.9%)

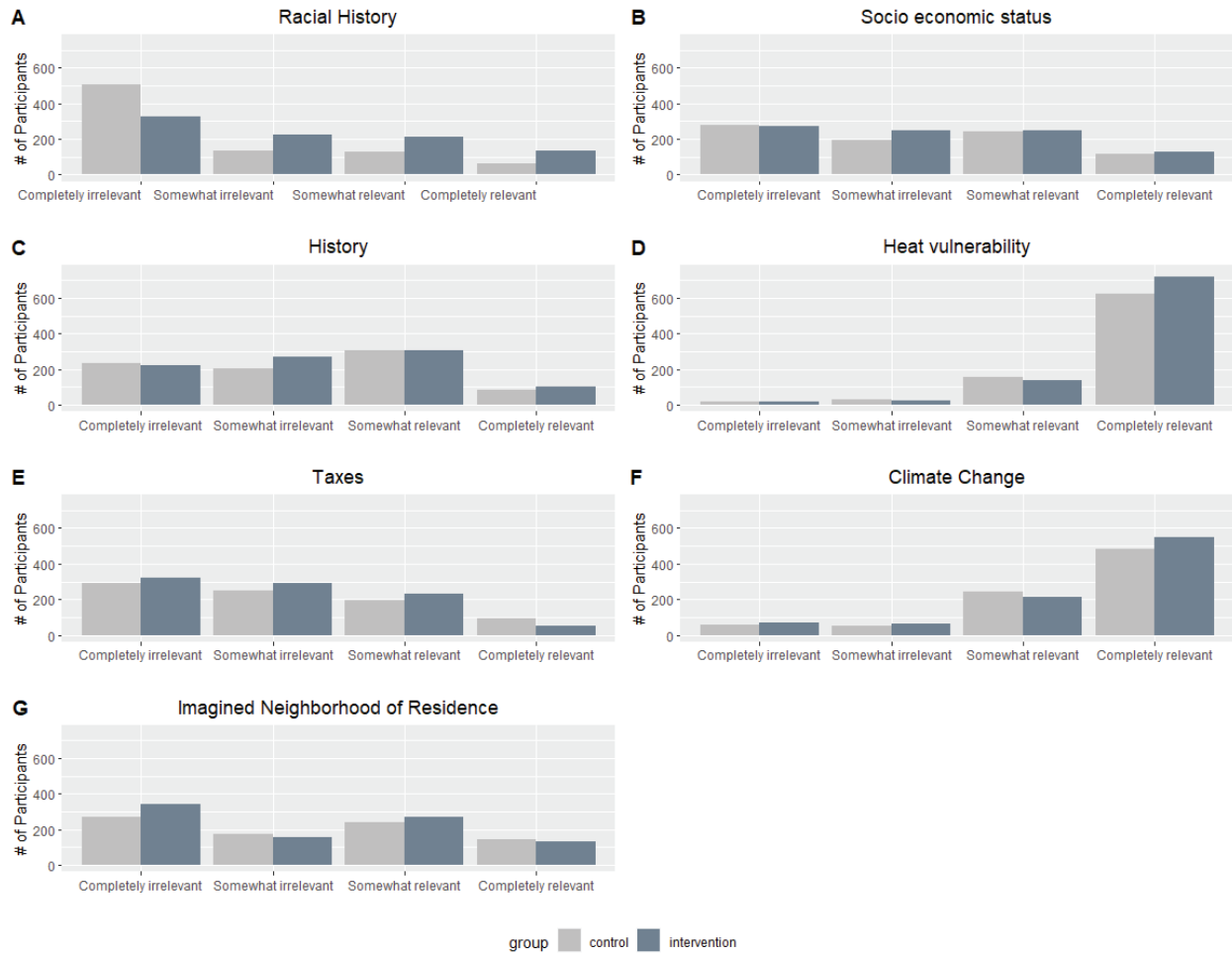


Figure B7. Distributions of response for relevance factors related to preferences for the distributive justice strategies

3. Sampling Post-Analysis

Summary

The purpose of this analysis is to understand whether the differing dropout/filter-out rates between the two groups had a meaningful difference on study outcomes. Based on the analysis below, it does not appear that there was a meaningful effect on the sample. First, two of the most likely explanations for the differing rates are explored below and then a comparison of the demographic proportions between the intervention and control groups are statistically explored.

While the analysis done here did not indicate that the differential attrition had a meaningful effect on the data, an unmeasured, unknown variable could have revealed a potential effect. For this reason a sensitivity analysis was conducted. The sensitivity analysis demonstrates that an unmeasured, unknown variable could have potentially affected the outcome of the study, which is a limitation that readers should be aware of.

Reason 1 (Longer video): In the design of the intervention video, the additional 50-second clip did not seem to be a drastic extension — especially since both videos are under 3 minutes and there is a similar mid-video dropout rate between the two groups (Table C1), and previous place-based racial history intervention have been as long as 11 minutes. However, the difference between this and previous interventions is that participants knew that they would need to retain enough details to actively engage with an unknown activity. It is possible that among a lot of new information, the information about racial history was just quickly forgotten by some who filtered it out as ‘not relevant enough’. If there is a systematic bias in the sampling method, this explanation would suggest that the ‘perceived relevance’ analysis is the component of the study that would be most directly affected. In the paper, there was a significant difference between the intervention and control groups for this variable. This is a missing data problem, since there is no way to know what the responses of filtered out participants would have been. However, in the future it would be important to ask any filtered out participants for their demographic information and the relevance question, for which they would be compensated at a reduced rate.

Reason 2 (Suboptimal question format): The question that was used to filter participants was a ‘select all that apply’ multiple choice question with 3 options, the third of which was mutually exclusive to the other two (Figure C1). As seen in Table C2, which shows every collected response to the question, participants in the control (C) and intervention (I) groups were correctly answering ‘Health impacts of extreme heat’ at the same rate (C = 87.7%, I=86.2%). The ‘history of the highway’ answer, which was only correct for the intervention group, was also answered correctly most of the time (C=5.4%, I=78.6%). However, the rate of participants in the intervention group selecting the history questions was that group’s only requirement for moving forward in the study.

Table C1: Excluded participants

	Control	Intervention	Total
	N=174	N=293	N=467
Early Drop out			
Mid-video	5 (2.9%)	7 (2.4%)	12 (2.6%)
Dependent variable	0 (0%)	2 (0.7%)	2 (0.4%)
Post-video Attention Check			
Incorrect response	108 (62.1%)	228 (77.8%)	336 (71.9%)
Comprehension Check			
Question 1 incorrect	14 (8.0%)	11 (3.8%)	25 (5.4%)
Question 2 incorrect	8 (4.6%)	13 (4.4%)	21 (4.5%)
Incomplete/drop out	19 (10.9%)	13 (4.4%)	32 (6.9%)
Self-Report			
Data not useful	7 (4.0%)	7 (2.4%)	14 (3.0%)
Lack of attention	6 (3.4%)	4 (1.4%)	10 (2.1%)
Technical difficulty	6 (3.4%)	8 (2.7%)	14 (3.0%)

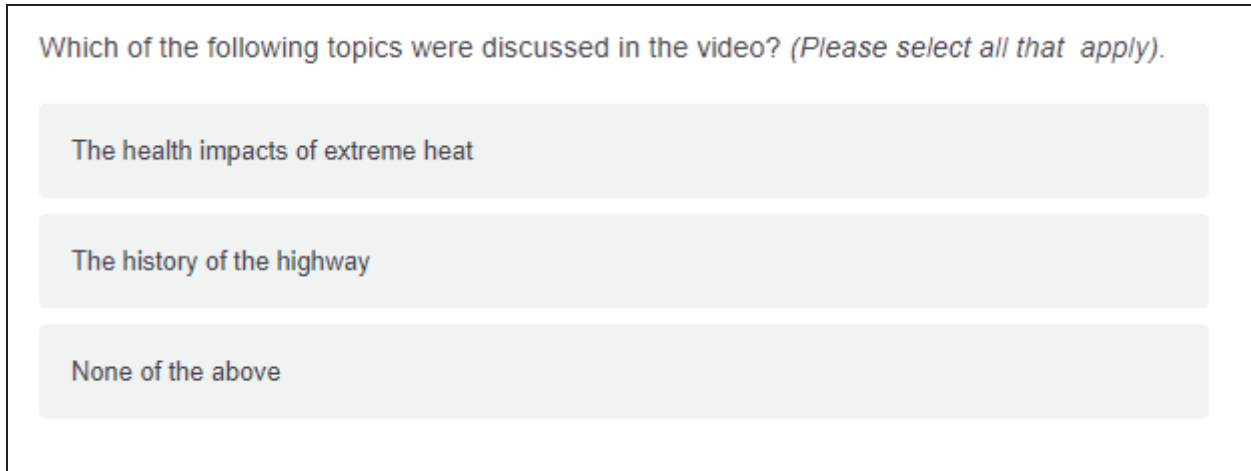


Figure C1. Screenshot of the attention check question in Qualtrics. ‘None of the above’ was a mutually exclusive option that was always presented last, the other two were presented in a randomized order.

Table C2. The response data from the attention check. A score of 0 means that the answer was not selected, a score of 1 means the answer was selected, and a score of ‘missing’ means that the question was not answered.

	control (N=1038)	intervention (N=1234)	Overall (N=2272)
factor(ManipluationCheck_health)			
0	91 (8.8%)	122 (9.9%)	213 (9.4%)
1	910 (87.7%)	1064 (86.2%)	1974 (86.9%)
Missing	37 (3.6%)	48 (3.9%)	85 (3.7%)
factor(ManipluationCheck_history)			
0	945 (91.0%)	216 (17.5%)	1161 (51.1%)
1	56 (5.4%)	970 (78.6%)	1026 (45.2%)
Missing	37 (3.6%)	48 (3.9%)	85 (3.7%)
factor(ManipluationCheck_none)			
0	929 (89.5%)	1166 (94.5%)	2095 (92.2%)
1	72 (6.9%)	20 (1.6%)	92 (4.0%)
Missing	37 (3.6%)	48 (3.9%)	85 (3.7%)

Because this question was formatted as a ‘select all that apply’ question, it is likely that much of the discrepancy is due to participants incorrectly interacting with the question type and only selecting one of the right answers. The question was unintentionally harder because it was formatted as a ‘select all that apply’ question, where both answers were true for the intervention

group. However, if they did not report that there was history in the video, their answer was counted as incorrect. The order of the choices was randomized, so participants may have selected one correct answer without both of the correct answers. Conversely, in the control group, there were complaints from participants getting filtered out because past tense was used once in the video, so it was viewed as a trick question. This happened right at the beginning of data collection, so data collection was paused and both answers were allowed for control participants. There was still a wrong answer for both groups -- *none of the above*. ‘Select all that apply’ questions can be problematic for the reasons discussed here and a more accurate format may be to ask a series of ‘yes or no’ questions instead (Lewis, 2021). This is the approach that will be used in future iterations of this project.

The most likely impact that this would have on the data is that the participants who made it through the intervention group would potentially be paying more attention than the participants in the control group (because their video was longer and attention check was slightly more difficult). However, there were other comprehension and attention checks later in the study that were able to filter out inattentive participants in the control group.

A likely reason for participants mishandling a ‘select all that apply’ question is that they were rushing too quickly through the study. Participants who were not willing to spend the necessary amount of time to complete the study would likely add more random noise to the data. Though this analysis cannot definitively conclude that the study disproportionately filtered out any specific group beyond those not paying attention, it does appear that a lack of attention did play a role in these filtering rates. The demographic analysis below seeks to address concerns that the question systemically, but unknowingly filtered out participants whose perspectives would have altered the findings in the study.

Sensitivity Analysis

Despite the indication that the data was not affected by differential attrition, we cannot rule out that unmeasured variables could indicate systematic exclusions. For this reason, a sensitivity analysis was conducted to understand how the best- and worst-case scenarios for this situation would affect the outcome of the study. Given the fact that our dependent variable was a one-item measure, sensitivity was a known challenge with the study design and it was discussed in the manuscript.

Scenarios

Best Case Scenario

In a best-case scenario, where all excluded intervention participants responded with ‘strongly support (6)’ six and all excluded control participants responded with ‘strongly oppose (1)’, the difference in means would be $\Delta = 0.76$. Using a Welch’s test, $t(1702) = -11.90$, $p = 0.00$ (Table

C61). The 99% confidence interval would range from -infinity to -0.619. The effect size would be $d=0.53$. These results would support our hypothesis.

Worst Case Scenario

In a worst-case scenario, where all excluded intervention participants responded with ‘strongly support (1)’ six and all excluded control participants responded with ‘strongly oppose (6)’, the difference in means would be $\Delta = 0.82$. Using a Welch’s test, $t(2000.2) = 11.95$, $p = 1.0$ (Table C61). The 99% confidence interval would range from -infinity to 0.98. The effect size would be ($d=0.52$). These results would not support our hypothesis and would not suggest the existence of a relationship between these variables.

‘In-between’ Scenarios

If all participants who were filtered out responded the same way, regardless of exposure to the intervention, the differences would not be significant for a response of 1, 2, 3, 4, or 5. If all filtered participants were to have responded with 6, there would have been a significant difference between the groups that supported our hypothesis.

Table C61. Results of a sensitivity analysis looking at the possible scenarios that could occur as a result of differential attrition

Scenario	Intervention (n=1128)				Control (n=939)	df	t	p	Cohen d	99 % CI	
	Intervention (n=1128)		Control (n=939)							LL	UL
	M	SD	M	SD							
Best Case	4.92	1.22	4.16	1.64	1702	-11.90	0.000	-0.532	-inf	-0.619	
All 6s	4.92	1.22	4.73	1.26	1970.3	-3.53	0.000	-0.156	-inf	-0.066	
All 5s	4.72	1.10	4.62	1.19	1937.3	-2.11	0.018	-0.0934	-inf	0.011	
All 4s	4.52	1.12	4.50	1.19	1950.8	-0.39	0.350	-0.0171	-inf	0.100	
All 3s	4.32	1.28	4.39	1.28	1996.9	1.19	0.883	0.0525	-inf	0.199	
All 2s	4.12	1.53	4.27	1.44	2034.7	2.36	0.991	0.104	-inf	0.306	
All 1s	3.91	1.83	4.16	1.64	2054	3.16	0.999	0.139	-inf	0.419	
Worst Case	3.91	1.83	4.73	1.26	2000.2	11.95	1.000	0.519	-inf	0.976	