

WEB MATERIAL

A Driver in Health Outcomes: Developing Discrete Categories of Transportation Insecurity

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Web Table 1. Transportation-Related Survey Questions

Item Label	Question Wording
16-Item Transportation Security Index	
Late	To get to the places they need to go, people might walk, bike, take a bus, train or taxi, drive a car, or get a ride. In the past 30 days, how often were you late getting somewhere because of a problem with transportation?
Took longer	In the past 30 days, how often did it take you longer to get somewhere than it would have taken you if you had different transportation?
Waiting	There are times when we need to wait for transportation to pick us up. In the past 30 days, how often did you spend a long time waiting because you did not have the transportation that would allow you to come and go when you wanted?
Early	In the past 30 days, how often did you have to arrive somewhere early and wait because of the schedule of the bus, train, or person giving you a ride?
Reschedule	In the past 30 days, how often did you have to reschedule an appointment because of a problem with transportation?
Skipped	In the past 30 days, how often did you skip going somewhere because of a problem with transportation?
Not able to leave	In the past 30 days, how often were you not able to leave the house when you wanted to because of a problem with transportation?
Worried	In the past 30 days, how often did you worry about whether or not you would be able to get somewhere because of a problem with transportation?
Stuck	In the past 30 days, how often did you feel stuck at home because of a problem with transportation?
Not invited	In the past 30 days, how often do you think that someone did not invite you to something because of problems with transportation?
Avoiding	In the past 30 days, how often did you feel like friends, family, or neighbors were avoiding you because you needed help with transportation?
Left out	In the past 30 days, how often did you feel left out because you did not have the transportation you needed?
Felt bad	In the past 30 days, how often did you feel bad because you did not have the transportation you needed?
Inconvenience	In the past 30 days, how often did you worry about inconveniencing your friends, family, or neighbors because you needed help with transportation?
Relationship effects	In the past 30 days, how often did problems with transportation affect your relationships with others?
Embarrassed	In the past 30 days, how often did you feel embarrassed because you did not have the transportation you needed?
Transportation Insecurity Single-Item Self-Report	
Transportation insecurity is a condition in which a person is unable to move from place to place in a safe or timely manner because they lack the financial or other resources necessary for transportation. In the past 30 days, how often have you experienced transportation insecurity?	
Open-Ended Question	
Please describe how you get from place to place and any problems you have with transportation.	

WEB APPENDIX

Elaboration of *K*-Means Clustering as a Method for Categorizing the TSI

As noted, *K*-means clustering is a purely quantitative, non-deterministic partitional clustering method that clusters observations into *k* mutually exclusive and exhaustive categories (MacQueen 1967). Using each observation's unweighted continuous TSI sum score as input, the initial *k* group means are defined as the continuous TSI sum score of *k* randomly selected observations. Each observation is then assigned to the group with the mean continuous TSI sum score closest to its own.

Here, closest is defined using the Euclidean (or Minkowski) distance for observations *i* and *j* which is defined as: $\left\{ \sum_{a=1}^p (x_{ia} - x_{ja})^2 \right\}^{1/2}$

Because we are using each observation's TSI sum score as the only input to the model, the equation simplifies to $x_i - x_j$ because *p*, the number of inputs per observation, equals 1. Once all observations have been assigned to a group, each group's mean is recalculated. The process repeats until group assignment does not change between iterations. Cut points are then identified by observing the range of TSI sum scores within each of the *k* groups.

To determine the number of groups into which observations are classified, we took into consideration properties of the model and of our data. Generally, smaller values of *k* will result in solutions that are more reproducible; however, meaningful substantive differences between observations might be missed. Therefore, we desired to identify a *k* which provided as much description of the population that could be generally reproduced. We determined that between three and six distinct categories of transportation insecurity could be theoretically and empirically justified (i.e., low, moderate, high vs. secure, low, marginal, moderate, high, severe). Accordingly, we estimated *k*=3, *k*=4, *k*=5, and *k*=6 means clustering models. Further, because the method is nondeterministic (i.e., results could differ each time the model is estimated), we re-estimated each model 10 times.

Web Table 2. Odds Ratios for Associations Between Transportation Insecurity (Coded as a Continuous Measure) and Health Conditions

Variable	Poor Self-Rated Health ^a		Depressive Symptoms ^b	
	(N = 1,989)		(N = 1,946)	
	OR	95% CI	OR	95% CI
TSI score	1.06	1.03, 1.09	1.12	1.08, 1.15
Household income				
< \$15,000	1.00	Referent	1.00	Referent
\$15,000 - \$29,999	0.43	0.27, 0.70	0.69	0.39, 1.21
\$30,000 - \$49,999	0.67	0.42, 1.07	0.81	0.47, 1.42
\$50,000 - \$74,999	0.37	0.22, 0.61	0.55	0.31, 1.00
≥ \$75,000	0.24	0.15, 0.39	0.51	0.30, 0.87
Age				
25-39 years	1.00	Referent	1.00	Referent
40-65 years	1.52	0.99, 2.32	0.59	0.40, 0.88
> 65 years	2.22	1.38, 3.57	0.50	0.30, 0.84
Highest level of education				
Less than high school	1.00	Referent	1.00	Referent
High school	0.66	0.40, 1.09	0.99	0.55, 1.80
Some college	0.46	0.27, 0.80	0.82	0.45, 1.52
Bachelor's degree or higher	0.41	0.23, 0.73	0.49	0.25, 0.96
Race/ethnicity				
Black non-Hispanic	1.00	Referent	1.00	Referent
Hispanic	0.91	0.48, 1.72	1.65	0.79, 3.43
Other non-Hispanic	0.79	0.32, 1.96	1.61	0.69, 3.76
White non-Hispanic	1.00	0.59, 1.68	1.39	0.72, 2.67
Marital status				
Not married	1.00	Referent	1.00	Referent
Married	0.64	0.44, 0.92	1.00	0.68, 1.47
Sex				
Male	1.00	Referent	1.00	Referent
Female	0.80	0.58, 1.11	1.45	1.02, 2.08

Abbreviations: AIC, Akaike Information Criterion; CI, confidence interval; N, number of observations; OR, odds ratio.

^a AIC = 1,603.

^b AIC = 1,452.