



# Neighborhood Crime and Transit Station Access Mode Choice – Phase III of Neighborhood Crime and Travel Behavior

Christopher Ferrell, PhD, Shishir Mathur, PhD, and Bruce Appleyard, PhD

MTI Project 1107

August 2015

SJSU Research Foundation  
210 N. Fourth St., 4th Fl.  
San José, CA 95112

Tel // 408.924.7560  
Fax // 408.924.7565

transweb.sjsu.edu

## Board of Trustees

### Founder

*Secretary Norman Mineta*

### Honorary Co-Chairs

*Congressman Bill Shuster  
Congressman Peter DeFazio*

### Chair

*Nuria Fernandez*

### Vice Chair

*Grace Crunican*

### Executive Director

*Karen Philbrick, Ph.D.*

Joseph Boardman  
Anne Canby  
Donna DeMartino  
William Dorey  
Malcolm Dougherty  
Mortimer Downey  
Rose Guilbault  
Ed Hamberger  
Steve Heminger  
Diane Woodend Jones  
Will Kempton  
Art Leahy  
Jean-Pierre Loubinoux  
Michael Melaniphy  
Abbas Mohaddes  
Jeff Morales  
David Steele, Ph.D.  
Beverly Swaim-Staley  
Michael Townes  
Bud Wright  
Edward Wytkind

### Emeritus

### Executive Director

*Rod Diridon, Sr.*

This report provides the findings from the third phase of a three-part study about the influence of neighborhood

crimes on travel mode choice. While previous phases found evidence that high levels of neighborhood crime discourage people from choosing to walk, bicycle, and take transit, which was consistent with the authors' hypothesis, they also produced counterintuitive findings suggesting that in some cases, high crime neighborhoods encourage transit ridership at the expense of driving—the opposite of what common sense would suggest. Phase 3 tested possible explanations for these counterintuitive findings with a series of methodological improvements. These improvements yielded strong evidence supporting the hypothesis that high-crime neighborhoods encourage driving, and they generated none of the counterintuitive findings from previous phases.

**High-crime neighborhoods encourage driving and discourage walking, bicycling, and transit ridership.**

## Study Methods

This study used logit modeling techniques to test the following five improvements:

- Improvement 1: Used the Bay Area Rapid Transit (BART) system's 2008 Station Profile Survey travel data set.
- Improvement 2: Separated drop-off and drive-alone modes in logit models.
- Improvement 3: Variables at the corridor level replaced previous variables at the transportation analysis zone (TAZ) level.
- Improvement 4: Average parcel size (APS) variable replaced the intersection density measure of urban design.
- Improvement 5: Used nested logit modeling techniques.

## Findings

This study tested four possible reasons for the confusing results from earlier phases. First, it could be possible that the Bay Area Travel Survey (BATS) 2000 travel data set was not suitable for the neighborhood scale of analysis. Improvement 1 compared the BATS 2000 models (Phase 2) with models using BART 2008 data. The BART 2008 models effectively eliminated the confusing results from earlier phases.

Second, it could be possible that people seek the relative safety of an enclosed transit vehicle where they feel less exposed to neighborhood crimes—the so-called Neighborhood Exposure Hypothesis. Improvement 1 models—in which crimes had a negative influence on transit mode choice—and Improvement 5 models—in which nested models that grouped modes

into unexposed (closed) and exposed (open) modes performed poorly compared with those run in Improvement 4, suggest that the Neighborhood Exposure Hypothesis does not explain the confusing results from Phases 1 and 2.

Third, urban form and crimes may be interwoven as causal determinants of mode choice. Improved urban form and crime variables might help disentangle their effects. Improvement 3 models—in which corridor-level urban form and crime variables replaced TAZ-level variables—and Improvement 4 models—in which the APS variable was introduced to better represent urban design—did not yield results that changed the signs or significance of the crime variables.

Finally, the modeling methods used in Phase 2 may have been inadequate in two respects. First, the categorization of modes used in Phase 2 models may have been inadequate. Improvement 3 addressed this issue by separating drive-alone from drop-off modes but did not substantially affect the signs or significance of the crime variables. Second, the Phase 2 models may have been inadequate for representing mode choice decisions. Improvement 5 employed nested logit modeling techniques with the hope that this might generate more interpretable results, but they did not. These findings suggest it is unlikely that the modeling methods used in previous phases caused the confusing crime variable results.

Improvement 1 (exchanging BATS 2000 for BART 2008 data) produced the largest gains and confirmed the original hypothesis that neighborhood crimes discourage people from using alternatives to the automobile.

## Policy Recommendations

The authors made the following policy recommendations:

- Policy-makers should consider a range of interventions—from land use changes, to gas taxes, to neighborhood policing—to encourage non-auto mode choices. Improved crime intervention strategies may hold promise for more immediate benefits compared with long-term land use changes, and they should be considered as part of a larger package of measures to reduce auto dependency.
- Transit agencies should work in close collaboration with local police departments to reduce crimes and increase non-auto access to their transit systems and transit ridership overall.
- Transit agencies, local governments, and emergency service providers should consider working collaboratively to integrate crime prevention through environmental design (CPTED) methods into local planning and building codes and into transit-oriented development (TOD) plans and policies.

## About the Authors

Christopher Ferrell, PhD, is a co-founder of CFA Consultants. Shishir Mathur, PhD, is a professor at San Jose State University. Bruce Appleyard, PhD, is an assistant professor at San Diego State University.

## To Learn More

For more details about the study, download the full report at [transweb.sjsu.edu/project/1107.html](https://transweb.sjsu.edu/project/1107.html)

MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Research and Innovative Technology Administration and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business. [WEBSITE transweb.sjsu.edu](https://transweb.sjsu.edu)