

# Impact of Mode and Mode Transfers on Commuter Stress

Principal Investigators: Gary Evans, Polytechnic University, Richard Wener, Cornell University

This paper reports on a natural experiment, which studied groups of commuters who are equivalent in most important demographic respects, and who had equivalent commuting experiences, but were differentially affected by a new and improved mass transit (rail) route to work. These commuters changed a significant aspect of their commute, but did not change other critical aspects of their lives (e.g., the start and end points of the trips, the jobs they go to, the homes they return to), so that commuting changes were not confounded with other life changes. This study also provided the opportunity to experimentally study - and longitudinally follow - the impacts of this major change in travel time and number of mode transfers in a much more controlled fashion than has been possible heretofore. In addition to this longitudinal study of actual commuters, we also conducted a true experiment using student subjects as simulated commuters, sending them on trips that were identical to those taken by our real commuter subjects, to see if these effects could be replicated under these controlled, even if somewhat more contrived, conditions.

We hypothesized that (i) persons who travel on the new Midtown Direct Service will experience less stress and be more satisfied with their commute to work; (ii) these salutary effects will be caused one or more of several factors: a. enhanced perceived control/predictability over the commute; b. less effort expenditure to make the commute; or c. reduced time of the commute; and (iii) women will experience greater commuting stress than men.

Hypothesis one was supported. Riders on the new Midtown Direct line had lower stress scores on salivary cortisol, a motivation performance measure, and perception of stress scales. Hypothesis two was partially supported. This relationship between the commuting route and stress was mediated by the reduction in commuting time for the new train line. Predictability was related to stress but did not mediate the difference between routes. Hypothesis three was not supported. There were no significant differences between men and women. Study two largely replicates these results. Students, simulating the routes of real commuters, also showed less stress on the Midtown Direct route than on the Hoboken-PATH route. The report discusses the implications of these findings and further research needed.

	Pre-change data collection travel route for commuters (spring, '96)	Post-change data collection travel route for commuters (after Midtown Direct) Winter, Spring 99
<b>Comparison Group</b> (those who took, and continued to take, the Hoboken/PATH route)	NJT trains to Hoboken... PATH mostly to World Trade Center (downtown Manhattan)	NJT trains to Hoboken... PATH to World Trade Center (downtown Manhattan)
<b>Experimental group</b> (those who switched from the Hoboken/PATH to the new route)	NJT trains to Hoboken... PATH, mostly toward 33 <sup>rd</sup> St (midtown Manhattan)	NJT trains direct to Penn Station (midtown Manhattan)

Lessons from this study were published in:

G.W. Evans, R.E. Wener, and D. Phillips (2002), "The morning rush hour: Predictability and commuter stress," *Environment and Behavior*, 34, 521-530.  
 R.E. Wener, G.W. Evans, D. Phillips, N. Nadler (2003), "Running for the 7:45: The effects of public transit improvements on commuter stress." *Transportation*, 30, 203-220.

**Sponsors:** U.S. Department of Transportation  
 New Jersey Department of Transportation  
**Completion Date:** 2004

