New England University Transportation Center

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Final Report

Project Title:

Encouraging Alternative Transportation Behavior among Baby Boomers

Project Number:	**Project End Date:**	**Submission Date:**
URIR23-14	April 30, 2013	March 26, 2013

The heavy reliance on single occupancy vehicles used by commuters is one of the most preventable contributors to the carbon footprint of campuses and communities. Besides technical innovations, behavior change is pivotal to reducing SOV (single occupancy vehicle) travel. This proposal addresses the NEUTC theme *strategic management of disruptive change in transportation systems*. It is designed to apply the Transtheoretical Model of Change (TTM) to baby boomer populations to improve transportation choices, help the environment, and the quality of life in campus communities. Given the tremendous success of TTM in other areas of behavior change this team has developed an innovative project, which can serve as a model for sustainable transportation for campuses and communities nationwide.

The work presented here reflects the findings of a multi-year, multi-site interdisciplinary project designed to promote alternative/sustainable transportation and to encourage mode shift from single occupancy vehicle commuting to transit, carpooling, walking or biking. Comparative analysis of data sets supports the assumption that the terms *Sustainable Transportation* and *Alternative Transportation* are comparable; consequently *Sustainable Transportation* (ST) will be used here. Supported by NEUTC as well as the University of Rhode Island TC, this work lays the groundwork for developing effective interventions to promote transportation behavior change, especially for those who are currently *not* ready for such a change.

A study of faculty, staff and students at two public universities in the Northeast was designed to develop and test the methodology of applying the TTM to transportation behavior. This highly successful approach was combined with geospatial modeling to maximize impact on students and older University commuters. Since a systematic application of the model to sustainable transportation behavior was previously lacking, short, valid and reliable TTM measures had to be developed first.

In an initial study (n=588) Decisional Balance and Self-Efficacy scales were validated, replicating hypothesized relationships to stages of change. Participants (primarily students) were distributed across the stages of change 57.9% in Precontemplation, 10.8% in Contemplation, 3.7% in Preparation, 13.7% in Action, and 13.9% in Maintenance. Analyses confirmed a two-factor Decisional Balance structure and a unifactorial 8-item Self-efficacy structure, with good item loadings (>.70) and excellent internal consistency ($\alpha = .90$). ANOVAs revealed that scores on the Cons subscale outweighed those of combined Pros subscales in the Precontemplation stage, while the opposite was true in the Action and Maintenance stages. Across stage of change, ANOVA revealed a significant stage effect for Self-efficacy, accounting for 13% of the variance. Individuals in the Precontemplation stage had significantly lower scores than those in the other four stages. These findings indicate that the TTM model is a good fit for *Sustainable Transportation*.

The main study for this project assessed travel behavior, demographics, behavioral dispositions and campus cultures across two colleges (n=1696). Using the TTM measures developed earlier, data were collected for the University of Rhode Island (URI) and the University of New Hampshire (UNH) in order to assess the impact of campus culture and policies along with geographical location on stages of change. A total of n = 1696 students, faculty and staff participated. To facilitate comparison with data collected in earlier years, online data collection was supplemented with telephone surveys for faculty and staff at UNH. Transportation surveys measured commute patterns, behaviors, attitudes towards AT and geographical information (e.g., residence locations) among commuters at the two universities. The survey sample was segmented into one of five *Stages of Change*, a key TTM measure. Two additional constructs, *Decisional Balance* and *Self-Efficacy,* were also assessed. Participants'

location of residence, commute distance, travel behavior and demographics were collected and analyzed in light of TTM measures.

Students, staff and faculty showed different commute patterns and attitudes. Students had the shortest commute distances and practiced sustainable transportation more frequently than staff or faculty. Overall, commute distance negatively influenced both the use of and readiness to adopt ST. Other geographic location factors also affected ST usage and commuters' behavior and attitudes toward ST. Using geospatial models, the authors identified more ST users and greater readiness to use ST in towns with better public transit connectivity to the campuses. Commuters who lived near transit stops were more likely to use ST as their primary transportation mode. There were more ST commuters in the university with a better-developed transit system and a more established culture of sustainability. The impact of the transit system was greater among students than among faculty and staff.

For a follow-up study, a brief *multimedia video intervention* was designed and evaluated (n=732) to design effective future behavior change campaigns. Most respondents agreed or strongly agreed that they liked the program (84.1%). They also agreed that the program: gave them new things to think about (78.2%), could help them make some positive changes (75.5%), and increased their interest in ST (70.5%). Participants' stage of change for ST was also assessed pre- and post-intervention. A (desired) decrease was found from 62.9% in Precontemplation at pre-test to 42.1% at post-test, while the percentage of those in Contemplation increased from 16.6% at pre-test to 32.5% at post-test. A smaller positive shift from pre-test to post-test was found for Preparation stage (2.9% to 7.3%). Not surprisingly for such a brief intervention, proportions in Action and Maintenance stages were consistent from pre to post test. Small significant attitude changes from pre to post-test were also found: an increase in mean ST specific Pros (t(592)=7.04, p < .001) and a decrease in mean ST Cons (t(577)=-2.86, p < .01). Finally, participants rated their own likelihood of four options for increasing their ST behaviors. Of the four options, Carpooling (31.7%) was ranked most likely, followed by Public Transportation (11.8%), Walking (10.3%), and Biking (7.1%).

The assessment of ST behaviors provides a foundation for developing transportation interventions to promote ST usage, not only within, but also beyond the campus setting. This work will permit targeting not only of current ST users, but also of those who are not yet ready to use ST. It will help move them towards greater readiness to change their commuting behavior. An important finding in this pilot study is that the survey data for ST fit the TTM based model, which has been successfully applied to numerous other behaviors. Once implemented, this model and interventions based on it have great promise of being scaled to a modal shift among commuters outside a campus environment.

In related work, the authors have developed individualized Computer Tailored Interventions, which will provide individualized targeting of commuters based on TTM and geospatial information. These interventions can provide an effective and low-cost, individualized way to reach commuters and to encourage sustainable transportation. The work presented here can help transportation professionals change commuter behavior in a time of limited resources and increasing interest in encouraging mode change to reduce traffic, conserve fuel, and promoting active transportation modes.

This research has been disseminated in several domestic and international venues. In particular, 3 conference papers have been presented/accepted for presentation and 3 manuscripts for journals/conference proceedings will be submitted shortly. The first author has presented this research in Germany, Slovakia, and the Czech Republic and will do so in Sweden in June 2013.