Year 25 Final Report

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Project Title:

Social Network Effects on Attitudes about Pedestrian Street Crossing Behavior

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Principal Investigator: John N. Ivan

Title: Professor

University: University of Connecticut

Email: John.ivan@uconn.edu

Phone: +1 (860) 486-0352

Co-Principal Investigator: Nalini Ravishanker

Title: Professor

University: University of Connecticut

Co-Principal Investigator: Rebecca Townsend

Title: Associate Professor

University: University of Hartford

Project Description

The effectiveness of interventions to improve pedestrian safety, whether involving engineering, education, or enforcement, is limited by the behavior of the public in response to the interventions. It is not difficult to imagine that the behavioral response of an individual to engineering and educational road safety interventions may be at least partially explained by demographic characteristics. It is also plausible that membership and interactions in a social group influences an individual's behavior and attitudes about road safety and response to such interventions. This project employed a mixed survey framework of in-person gatherings and online respondent driven sampling surveys to explore how demographics, pedestrian safety education and social group membership and interaction explain an individual's behavior and attitudes related to crossing a signalized intersection as a pedestrian in different physical and travel settings. In-person survey samples were combined with respondent driven online samples to attempt to mitigate bias in the sampling frame and most efficiently glean information from both samples. Multinomial logit modeling was applied to the mixed sample to predict stated pedestrian behavior observed in both samples. The results shed light on pedestrian attitudes about traffic operations as well as identify how to most effectively improve pedestrian safety through education and social group interaction.

Significant Accomplishments

This section details the accomplishments made on the project.

Pedestrian Stated Behavior Survey Pilot-Tested in Community College Class

The research team prepared and pilot-tested a survey of individual attitudes and behavior regarding crossing urban streets as a pedestrian at signalized intersections. The survey consisted of questions about demographics, pedestrian crossing behavior and attitudes about traffic, as well as videos simulating different pedestrian street crossing environments. The survey was piloted in a communication class at Manchester Community College (MCC) in Manchester, Connecticut. In response to feedback from the students and observation of their understanding of the questions, the research team updated the survey questions and the framework of the survey itself. Subsequently, the research team implemented the survey in small group settings convened by students in communication classes at MCC. This constituted the "in-person" portion of the project data set.

Cascading Survey of Stated Pedestrian Behavior Pilot-Tested Online

The research team prepared and pilot-tested an online cascading survey of individual attitudes and behavior regarding crossing urban streets as a pedestrian at signalized intersections. The survey used for the in-person gatherings was also used here. The research team hired a contractor, Intellitics, Inc., to prepare the online version of the survey to be conducted using the proposed cascade sampling framework. The survey was piloted with colleagues and acquaintances of a faculty member at Manchester Community College (MCC) in Manchester, Connecticut. In response to feedback from the respondents, the research team streamlined the discussion portion of the survey framework to reduce the time and effort commitment of

respondents. Additional respondents were identified for successive waves of the cascading survey with acquaintances of other members of the research team.

Cascading Survey of Stated Pedestrian Behavior Implemented Online

The research team implemented the online cascading survey updated based on findings from the pilot test. Members of the research team invited members of their social networks to participate in the survey, with each group identified as a unique "tribe" in order to permit learning about how membership in each group is associated with individual responses. Each tribe was permitted to cascade over several weeks, with respondents inviting other individuals they know to join the tribe and participate. The team wrote SAS code to download the survey data and texts from discussions (collected by Intelletics and made available as google docs) into csv files ready for analysis. This was done for two large and two small "tribes" for whom the online survey was administered.

Online and In-person Survey Data Downloaded and Merged

The project team worked with the Intelletics team to download all the data pertaining to the different social groups (tribes) in the online survey. This consisted of numerical data reflecting crossing behavior before and after one of four interventions, numerical data on participant demographics, and text data on discussions among participants in two intervention groups. The data was saved in a format that will enable analysis using SAS and R. The team checked the data for consistency, and merged the data from the in-person surveys with the data from the online survey. This consists of all numerical data and text data from online and in-person discussions.

Statistical Analysis of Numerical Data

The project team used SAS and R to carry out an analysis to understand the nature of the crossing behavior of participants, as well as possible changes in behavior as a result of interventions. Analysis and findings from the in-person surveys is documented in a two papers. One was presented at *Road Safety on 5 Continents*. The second was submitted to the *Journal of Transportation Safety and Security.* The abstract for each, including summaries of key findings, are provided below. Unfortunately, the online data were too sparse to uncover any significant findings that would be useful for application or appropriate for publishing.

Text Mining of Discussions Data

The project team carried out qualitative analyses of the discussions from in-person surveys. We also carried out text mining and sentiment analysis on the discussions on pedestrian safety that were collected from participants. These augment the quantitative data analysis of the numerical survey data. Findings from this analysis are documented in two papers that have been submitted to *Communication Studies* and *Safety Science*; the abstracts are provided below.

Community Engagement Activities

National Public Radio Station Shares Study
WNPR, the Hartford, CT-based National Public Radio station, learned about Project UCNR25-33, Social Network Effects on Attitudes about Pedestrian Street Crossing Behavior, through one of the cascading invitations from the MCC participants and contacted co-PI Townsend about the study. Townsend and Ravishanker participated in an interview and the reporter shared Ivan's and Ravishanker's previous research that led to the need for the current work. The report was originally published by WNPR on February 16, 2016 at http://wnpr.org/post/survey-how-do-you-cross-connecticut-street#stream/0 and later re-blogged at Zoned: A blog about land use, transportation, and the built environment in Connecticut and elsewhere. http://zonedct.org/post/139439323383/survey-how-do-you-cross-a-connecticut-street. The reporter also included a link to the survey for WNPR website readers.

Town of Stamford Public Meeting
An elected representative of the Town of Stamford, Connecticut, Steven Kolenberg, organized a Town Forum on pedestrian safety on March 14, 2018. The forum was precipitated by a sharp increase in the number of pedestrian crashes and fatalities in the town in the first two months of 2018 compared to previous years. A member of the research team, PI John N. Ivan, was invited to speak on a panel at the forum. Findings from this project were presented to the audience. In fact, two of the 20 most hazardous intersections in the State with regard to pedestrian safety are located in the Town. Dr. Ivan discussed roadway, roadside and personal attitude factors that are related to pedestrian safety.

Dissemination of Research Findings

Findings from this research project have been documented in the following papers published in conference proceedings and archival journal publications. Following are the references and abstracts for these papers.

John N. Ivan, Nalini Ravishanker, Rebecca M. Townsend, Sha Al Mamun, Franklin Caraballo, and Yaohua Zhang. "Social Network Effects on Attitudes about Pedestrian Street Crossing Behaviour: Preliminary Findings". Presented at Road Safety on 5 Continents, Rio de Janeiro, Brazil, 2016.

The effectiveness of interventions to improve pedestrian safety, whether involving engineering, education, or enforcement, is limited by the behavior of the public in response to the interventions. It is not difficult to imagine that the behavioral response of an individual to engineering and educational road safety interventions may be at least partially explained by demographic characteristics. It is also plausible that membership and interactions in a social group influences an individual's behavior and attitudes about road safety and response to such interventions. This paper describes preliminary findings from a project that is employing a mixed survey framework of in-person gatherings and online respondent driven sampling surveys to explore how demographics, pedestrian safety education and social group membership and interaction explain an individual's behavior and attitudes related to crossing a signalized intersection as a pedestrian in different physical and travel settings. This paper describes the

findings from small size in-person samples. Multinomial logit modeling will be applied to predict stated pedestrian behavior. The results will shed light on pedestrian attitudes about traffic signal design and operation as well as identify how to most effectively improve pedestrian safety through education and social group interaction.

Windy Lawrence, Rebecca M. Townsend, John Ivan, Nalini Ravishanker, Sha Mamun, Franklin Caraballo, and Yaohua Zhang. "The Rhetorical Process of Justification in Pedestrian Safety Deliberations". Presented at the Eastern Communication Association 2017 annual convention in Philadelphia, PA.

This paper examines public deliberation on pedestrian safety using applied rhetorical criticism. Citizens engaged in the rhetorical process of justification, which heightened the understanding of pedestrian safety as a problem and also developed two competing norms, legal and cultural, to make sense of their values, beliefs, actions, and judgment. Three justifications for not following the law about where and when it is permissible to cross the street emerged: (1) following the law is not always wise because other people do not pay attention, (2) following the law is not always practical or convenient because the risk is worth the benefit of breaking the law, and finally (3) following the law is not always the best, because context often matters more. The findings will be used to inform transportation engineering and planning professionals as they decide how to create interventions that will reduce or prevent pedestrian injuries or fatalities.

Sha Al Mamun, Franklin Caraballo, John N. Ivan, Nalini Ravishanker, Rebecca M. Townsend, and Yaohua Zhang. "Identifying Association Between Pedestrian Safety Interventions and Street Crossing Behavior Considering Demographics and Traffic Context". Submitted to *Journal of Transportation Safety and Security*, 2017, in revision.

Pedestrian fatalities are becoming a larger percentage of overall fatalities in the United States, therefore better understanding of the expected effects of any interventions or treatments aimed at modifying pedestrian behavior is essential for improving pedestrian safety. This study used pedestrian safety interventions to assess their effect on the respondents' stated crossing behavior. Also, specific demographic data was used to identify behavioral trends regarding street crossing behavior. Results show that pedestrian safety interventions are significantly associated with changes in crossing behavior. The effect of the interventions was predominantly positive, since the respondents' behavior after the interventions were showed improvement relative to a comparison group. This study also found significant association between demographic variables and the compliance rate. Women were more compliant than men, and respondents aged twenty-five years or younger were more compliant after the interventions. Married respondents were more compliant than unmarried ones. Respondents who drive often were more compliant but having been involved in a car accident was not significant in explaining crossing behavior. The findings from this study could serve as a guide of potential factors or variables to be taken into consideration when studying street crossing behavior and consequently could help to improve pedestrian street crossing behavior models.

Rebecca M. Townsend, Windy Lawrence, John N. Ivan, Nalini Ravishanker, Sha Al Mamun, Franklin Caraballo and Yaohua Zhang "The Rhetorical Process of Justification in Pedestrian Safety Deliberations." Submitted to *Communication Studies*, 2018, in review.

This paper examines public deliberation on pedestrian safety using applied rhetorical criticism. Participants engaged in the rhetorical process of justification, which heightened the understanding of pedestrian safety as a problem and developed two competing norms, legal and cultural, to make sense of their values, beliefs, actions, and judgment. Three justifications for not following the law about where and when it is permissible to cross the street emerged: (1) following the law is not always wise because other people do not pay attention, (2) following the law is not always practical or convenient because the risk is worth the benefit of breaking the law, and finally (3) following the law is not always the best, because context often matters more.

Rebecca M. Townsend, Nalini Ravishanker, John N. Ivan, Yaohua Zhang, Sha A. Mamun, and Franklin Caraballo. " 'Cross' the 'Street' 'Just' 'Right': Analysis and Implications of Pedestrian Safety Discussions". Submitted to *Safety Science,* 2018, in review.

Many human factor studies of pedestrian safety focus on pedestrians' non-verbal behavior. Few analyze pedestrian's verbal communication about their street-crossing behavior. The aim of this study is to understand how people talk about pedestrian safety in Connecticut, USA. The paper reports the analysis of word frequency counts and the significance of the most frequently used terms in their conversational contexts. Using rhetorical theory in conjunction with conversation analysis as theories, we interpret the findings from a text-mining analysis of twenty-three discussions about pedestrian safety. The most frequently used words by participants were "cross, "street," "just," and "right." Analysis of these words in their contexts points to varied strategies for talk about safety. We find that when they speak about pedestrian safety, participants find fault with pedestrians rather than the people who kill or injure them while operating a motor vehicle. Results of this study of human factors influencing perceptions of crashes and near-crashes will help those who plan safety campaigns, and educational and policy interventions. This study also introduces the use of rhetorical theory and conversation analysis to human factors research.