Research Report Summary

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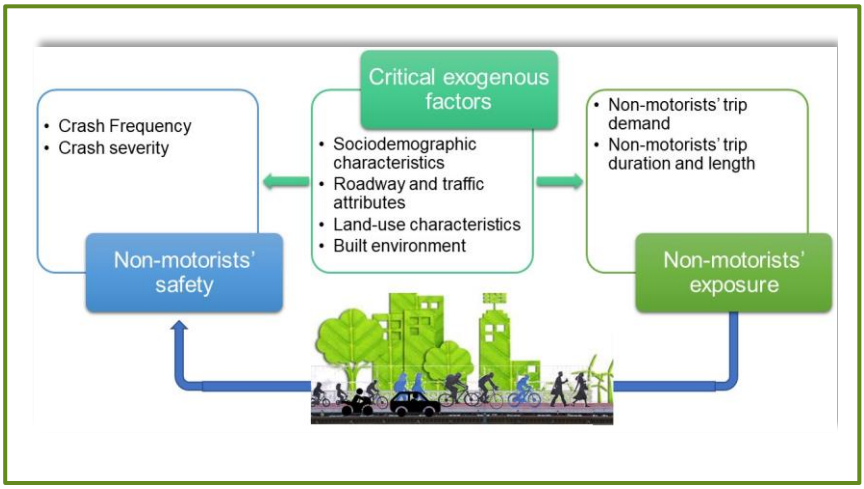
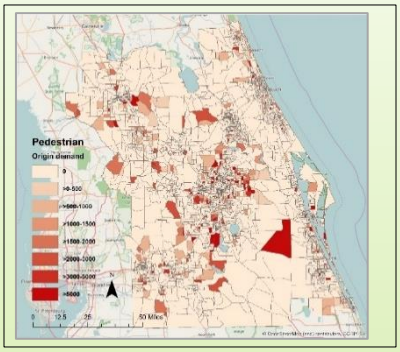
Enhancing Non-Motorized Safety by Simulating Non-Motorized Exposure using a Transportation Planning Approach

Non-Motorized Planning and Safety Evaluation

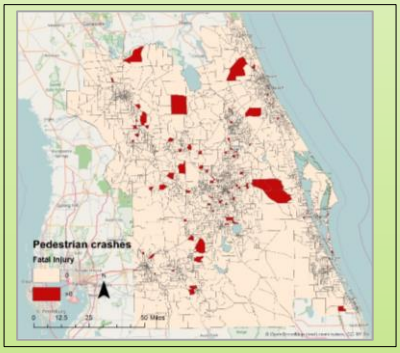
Safety researchers and analysists have employed land use and urban form variables as surrogates for traffic exposure information (pedestrian and bicyclist volumes and vehicular traffic). The quality of these crash prediction models is affected by the lack of "true" non-motorized exposure data. The current research effort is focused on developing a transportation planning simulation framework to generate exposure information for crash prediction models. Specifically, the research effort is focused on evaluating non-motorist exposure measures in terms of demand at a planning level. The evaluated exposure measures are incorporated in examining non-motorist safety, which would allow us to devise more evidence-based policy implications for improving overall safety and activities related to non-motorized modes of travel. The proposed research approach recognizes that non-motorized safety is affected by vehicular volumes and non-motorized activity at a macro-level in the urban region. The vehicular and non-motorized exposure measures



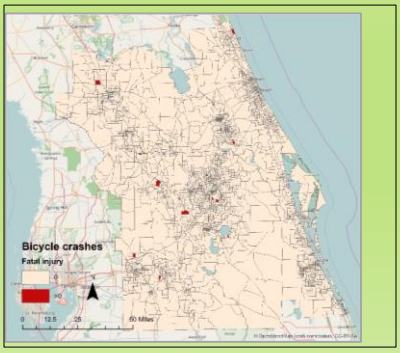
Exposure & Safety



Zones with Pedestrian Origin Demand



Fatal Pedestrian Crash Locations



Fatal Bicycle Crash Locations

are generated to enhance the vulnerable road user crash prediction models. In identifying non-motorist exposure measures, we develop aggregate-level demand models to identify critical factors contributing to non-motorist generators and attractors at a zonal level. In evaluating non-motorist safety, we estimate crash frequency and crash severity by proportion models for pedestrians and bicyclists. These models are estimated as a function of zonal-level sociodemographic characteristics, roadway/traffic attributes, built environment, land-use characteristics and exposure measures identified from demand models. The formulated demand models are estimated by using 2009 National Household Travel Survey data, and the crash models are estimated by using the Signal Four Analytics crash database for the year 2010 for the Central Florida region. Model estimation results are further augmented by a validation exercise. To demonstrate the implication of the estimated models, we also perform policy analysis for ten different scenarios, including changes in traffic volume within the vicinity of a central business district, reduction in zonal-level speed limit, increases in walking facilities and restrictions on the number of traffic lanes. From the policy scenario analysis, we identify beneficial changes to existing infrastructure and traffic operation for improving non-motorized road user safety at a planning level. The research methodology as proposed in our study recognizes that zonal-level attributes are likely to influence non-motorist exposure. At the same time, non-motorist exposure along with the zonal-level attributes are critical factors in developing non-motorist safety models.

"The research methodology as proposed in our study recognizes that zonal level attributes are likely to influence non-motorists' exposure. At the same time, non-motorists' exposure along with the zonal level attributes are critical factors in developing non-motorists' safety models."