This research investigates the main reasons leading the State of Florida to be ranked among the worst states in terms of pedestrian safety with four metro areas considered the most dangerous for pedestrians among all the United States as reported in the Dangerous by Design report. The study analyzes the characteristics and causation of pedestrian crashes that occurred in Central Florida over a 5 year period (2011-2015) at intersections and along roadway segments at midblock locations using the data obtained from the Signal 4 Analytics database. All pedestrian related crashes were compiled and all the 6,789 crash reports were studied thoroughly. Intersection and roadway pedestrian related crashes were identified along with all the parameters and conditions related to the high crash risk of pedestrians. However, due to inconsistencies in the police report inputs such as miscoding and misinterpretation, a screening criteria was developed to exclude or disqualify crashes that do not meet the research requirements.

Preliminary descriptive statistics revealed the most common types of crashes at each location. For intersection-related crashes, it was found that left turn, right turn and through moving vehicles struck crossing pedestrians. At midblock locations, major crash types were through moving vehicles hitting pedestrians crossing and walking along the roadway. Since all the variables were categorical, a categorical principal component analysis (CATPCA) was used to examine the parameters and reduce the number of variables analyzed.

The evaluated factors affecting pedestrian crashes were classified into four main categories; location characteristics (e.g. intersection, midblock, type of control, presence of crosswalk, presence of sidewalk), pedestrian factors (e.g. pedestrian under influence, failed to yield to the right of way), driver/vehicle characteristics (e.g. driving under influence, failed to yield to traffic control device, aggressive driving), and environmental-related factors (e.g. weather conditions, road surface conditions and time of day) were among the factors studied.

Three different models were utilized in the analysis using the SPSS statistical software package. A binary regression model was developed to understand the significant factors contributing to the main causes at each location type whether at an intersection or midblock crossing. An ordinal regression model was developed to identify the significant factors affecting the level of injury severity sustained by pedestrians. Lastly, a multinomial logit model was developed to predict the likelihood that a pedestrian will be involved into one of the common crash types.

The results of the binary model revealed that majority of the midblock crashes were attributed to pedestrians at fault among other contributing factors such as crossing at locations without traffic control device and without the presence of crosswalk. The chance of midblock crashes is 3.7 times higher in the absence of crosswalks compared to locations in which crosswalks are present. Conversely, intersection related crashes were attributed to drivers at fault, with drivers failing to obey traffic control devices and failing to yield to the pedestrian’s right of way as the most significant variables.

For the ordinal model, locations controlled by traffic signals, driver being at fault, right and left turning vehicles, as well as daytime and nighttime with street lighting were associated with low injury severity and a reduction in the likelihood of fatal crashes. However, red light running and aggressive driving related to intersection crashes, as well as pedestrian failing to yield to the right of way, and pedestrians under influence related to midblock crashes were associated with high injury severity and an increase in the likelihood of fatal crashes.

The multinomial logit model results revealed a high probability of right turn crashes associated with drivers at fault with aggressive driving during clear and cloudy weather conditions compared to left turn crashes. The results also showed that the probability of through moving vehicle crashes with no traffic control device was 9.495 times higher than left turn crashes. This results confirmed the results of the binary and ordinal models regarding midblock locations which are rarely controlled. Lastly, a greater probability of left turn crashes were associated with daytime conditions when compared to through crashes.

The findings of this research and examining the factors affecting pedestrians’ crash likelihood and injury severity can lead to better crash mitigation strategies, countermeasures and policies that would alleviate this growing problem in Central Florida.
Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2007, Omar Al Mukhtar University

Committee in Charge:
Hatim Abou Senna, Chair, Civil, Environmental, & Construction Engineering
Essam Radwan, Civil, Environmental, & Construction Engineering
Mohamed A. Abdelâ€™Aty, Civil, Environmental, & Construction Engineering

Approved for distribution by Hatem Abou Senna, Committee Chair, on March 7, 2017.

The public is welcome to attend.