

Assessing the impact of bicycle infrastructure treatment type on the frequency of right-hook conflicts between bicyclists and motor vehicles at signalized intersections.

Aikaterini Deliali, Chengbo Ai and Eleni Christofa

Keywords: Bicycle safety, signalized intersections, bicycle infrastructure treatments, right-hook conflicts, surrogate safety

Bicycle infrastructure treatments are implemented to enhance bicyclist mobility and safety. However, crashes between motorized vehicles and bicycles still occur at locations where these treatments are present, indicating the need to further investigate their safety impact. This paper aims to assess the impact of three segment-level bicycle treatments, namely: (1) conventional bike lanes, (2) protected bike lanes, and (3) sharrows (i.e., shared vehicle-bicycle traffic lanes) and two intersection-level bicycle treatments, namely (1) intersection crossing markings and (2) bike boxes, on right-hook conflicts, which is a common unsafe interaction between right-turning vehicles and through—bicycle at signalized intersections. Video data were collected from ten intersections in Boston, Cambridge, and Somerville, Massachusetts. Video recordings were processed to identify interactions between right-turning vehicles and through bicycles that corresponded to a Post Encroachment Time (PET) of less or equal to four seconds. Poisson models were developed to relate the number of traffic conflicts with the number of right-turning vehicles, through bicycles, and the treatment type. However, the latter was not found to affect conflict frequency. Further analysis of the PET thresholds showed that there is a significant difference in the recorded PET values depending on the user sequence in the conflict area. Specifically, when a motorized vehicle was followed by a bicycle, PETs of 1 second were more frequent compared to when a bicycle was followed by a motorized vehicle. This observation suggests that different thresholds for bicycle-leading or bicycle-following PETs may be considered to account to advance conflict-based bicycle safety approaches. The outcome of this research can inform practitioners on the selection of appropriate bicycle treatments and other countermeasures for improving intersection safety for bicyclists.