Built Environment and Injury

Assessment using a Crash Repository

EXERCISE SCIENCE
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Abstract

The Norwalk Bike/Walk Commission was established in 2017 [1] to support and improve the safety and availability of walking and biking as a main form of transportation and recreation in the city of Norwalk, CT. The commission works with the local and state government to modify the built environment, including roads, sidewalks, bike lanes, and more to optimize their safety and use. In collaboration with the commission, the purpose of this research is to identify top incident/crash sites at a specific area of the city (East Avenue) using the University of Connecticut Statewide Crash Repository [2]. The yearly incidence of crashes involving pedestrians and cyclists in Norwalk has ranged between 28 to 58 for pedestrians and 11 to 22 for cyclists in the last seven years [2]. The most prevalent injuries caused by these types of crashes are radial head fractures and other skull injuries, distorted limbs or primarily the upper body, and severe abrasions and lacerations. [3].

What is the built environment and how can it impact physical activity and safety?

The built environment is everything in communities that is man made. This includes roads, walkways, schools, parks, and much more. All aspects of a community's physical makeup have a large influence over its inhabitant's health, level of physical activity, and overall safety. Characteristics such as proximity between homes and buildings, street connectivity, access to bike lanes and public transportation, sidewalk presence, and others are directly correlated to health [4]. For example, access to sidewalks, parks, and bike lanes provide the public access to active transportation or recreational physical activity. The absence of important aspects of the built environment can have a negative influence on the public. Communities that lack access to public transportation, sidewalks, crosswalks, and bike lanes are characterized by less physical activity, active transportation, and a higher prevalence of pedestrian and cyclist incidents [4] . Street's width and two-way roads also report a higher prevalence of crashes with pedestrians [5]. One of the main factors that affects the public's physical activity are the safety features within their community [6]. Speeding cars and careless drivers were identified as hazards for walking and cycling [6]. Adults also report feeling unsafe around traffic and speeding cars because of the lack of pedestrian crossings and the short crossing time allowance [6]. These are all aspects of the built environment that directly affect physical activity.

What is a "Crash Repository" and how can it be used to examine injury related to walking and cycling?

The Connecticut Crash Data Repository (CTCDR) was created in 2011 by engineers and information technologists at the Connecticut Transportation Institute at the University of Connecticut. The CTCDR is a web tool designed to provide public access to motor vehicle crash data that is collected by both state and local police. The CTCDR allows individuals, institutions, and organizations to research crash safety data across the state with daily updated crash data. The CTCDR has a wide variety of data tools available including the basic report tool, crash dashboards, and Collision Analysis Summary Tables (CAST). For example, the Crash Story Maps gives users the ability to view crash data for specific emphasis areas such as crashes involving pedestrians and cyclists. The tool reports injury status, injury severity, and mortality in addition to the date and type of vehicle(s) involved.

Background

According to the National Highway Traffic Safety Administration (NHTSA), it is estimated that 4,600 to 5,300 pedestrians are killed by motorists, and 80,000 to 120,000 more are injured each year [5]. In the city of Norwalk, there were 14,818 crashes between 2010-2014, compared to 9,439 crashes within the past three years, with 20% of crashes resulting in injury, and 6% resulting in injury to a pedestrian or cyclist [2]. This reduction coincides with modifications to the built environment in the city including active improvements to the sidewalk system, bike lanes, busy intersections delineation, and signage for crosswalks and walking signals [1]. Although pedestrians and cyclists represent a small proportion of injuries due to car crashes, they represent a much higher portion of crash fatalities. For example, from 2015 to 2021, an average of 43 pedestrians and 16 cyclists per year were "severely injured" in Norwalk. Additionally, the majority of crashes involving bikes resulting in injury occurred in the last five years, with five taking place in a specific area of Norwalk, East Avenue, which is specifically examined in this study [2].

Methods

In collaboration with the Norwalk Bike/Walk Commission, the specific area of East Avenue. was assessed using the CTCDR for the precise location, date/time, number, type (pedestrian and cyclist), and injury (severity) since 2015. This location was selected due to communicated concern from residents of Norwalk and also coincides with significant planned modifications of East Ave within the next few years. Changes to East Avenue are currently being discussed by the commission.

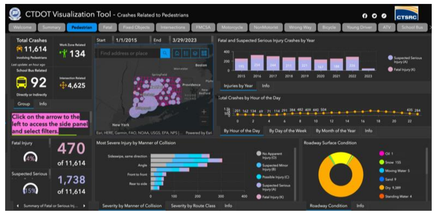


Fig. 5: Crash Story Maps

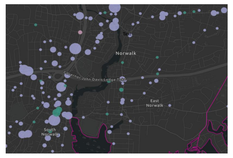


Fig.1: Pedestrian Crash Story Map

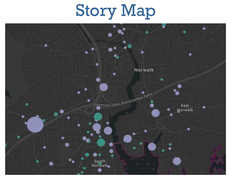


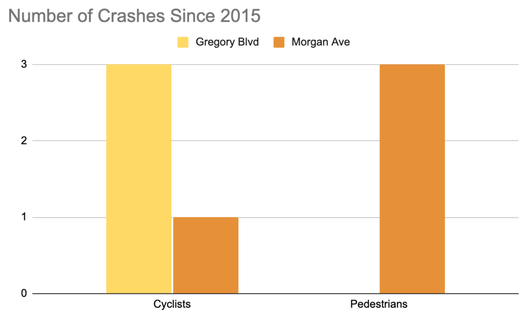
Fig.2: Cyclist Crash Story Map

Fig. 3: Morgan Avenue

Fig. 4: Gregory Blvd Roundabout

Fig. 5: Gregory Blvd Roundabout

Results

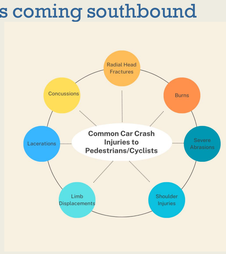


- Gregory Boulevard Pedestrian Crashes
  - No reported crashes involving pedestrians within the roundabout.
- Gregory Boulevard Cyclist Crashes
  - 6/11/2017 → Minor injury.
  - 3/30/2019 → Possible Injury.
  - 4/9/2022 → Minor Injury.
- Morgan Avenue Pedestrian Crashes
  - 12/4/2015 - Same location by Park St.
  - 11/15/2017 - Same location by Park St.
  - 5/18/2018 - Same location by Park St.
  - Note: All with possible injury.
- Morgan Avenue Cyclist Crashes
  - 5/18/2018 - Same location by Park St.
  - Note: With minor injury.

Discussion

In the last three years, Norwalk has had a total of 9,439 car crashes, averaging over 44 involving pedestrians and over 16 involving cyclists per year [2]. Majority of these crashes also presented some form of injury which were most likely some form of radial head fractures and other skull injuries, distorted limbs or primarily the upper body, and severe abrasions and lacerations, depending on how the pedestrian/cyclist were struck [5]. As seen from the data, both Morgan Ave and Gregory Blvd are valid areas of concern with Gregory Blvd having three cyclist crashes with possible injury since 2017 and Morgan Ave having three pedestrian crashes and a cyclist at the same intersection by Park Street since 2015 [2]. It can also be noted that a pedestrian crash and cyclist crash on Morgan Ave occurred on the same day in the same exact location. Contributing factors include no bike lane for cyclists to safely pass through on Gregory Blvd or Morgan Ave and no easy crosswalks for pedestrians coming southbound towards Morgan Avenue.

NORWALK BIKE/WALK COMMISSION



Take Home Messages

- Improving the built environment and decreasing the number of injuries caused by car crashes coincide.
- Severe injury and fatalities are much more likely to be caused within a pedestrian/cyclist car crash.
- The use of the Connecticut Crash Data Repository could not only be beneficial to researchers but to the public as well to gauge the safety level of specific cities or their very own neighborhood. Promoting this data tool could also be a contributing factor to decreasing injury risk.
- To improve these locations, the city of Norwalk would need to advocate for adding bike lanes to East/Ave Gregory Blvd and the addition of crosswalks as well. Not only that but adding sidewalks to Gregory Boulevard's roundabout would be extremely beneficial.

References

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