Emerging E-Bike Injury Crisis

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Objectives

1. Understand the injury patterns seen in riders of E-Bikes.

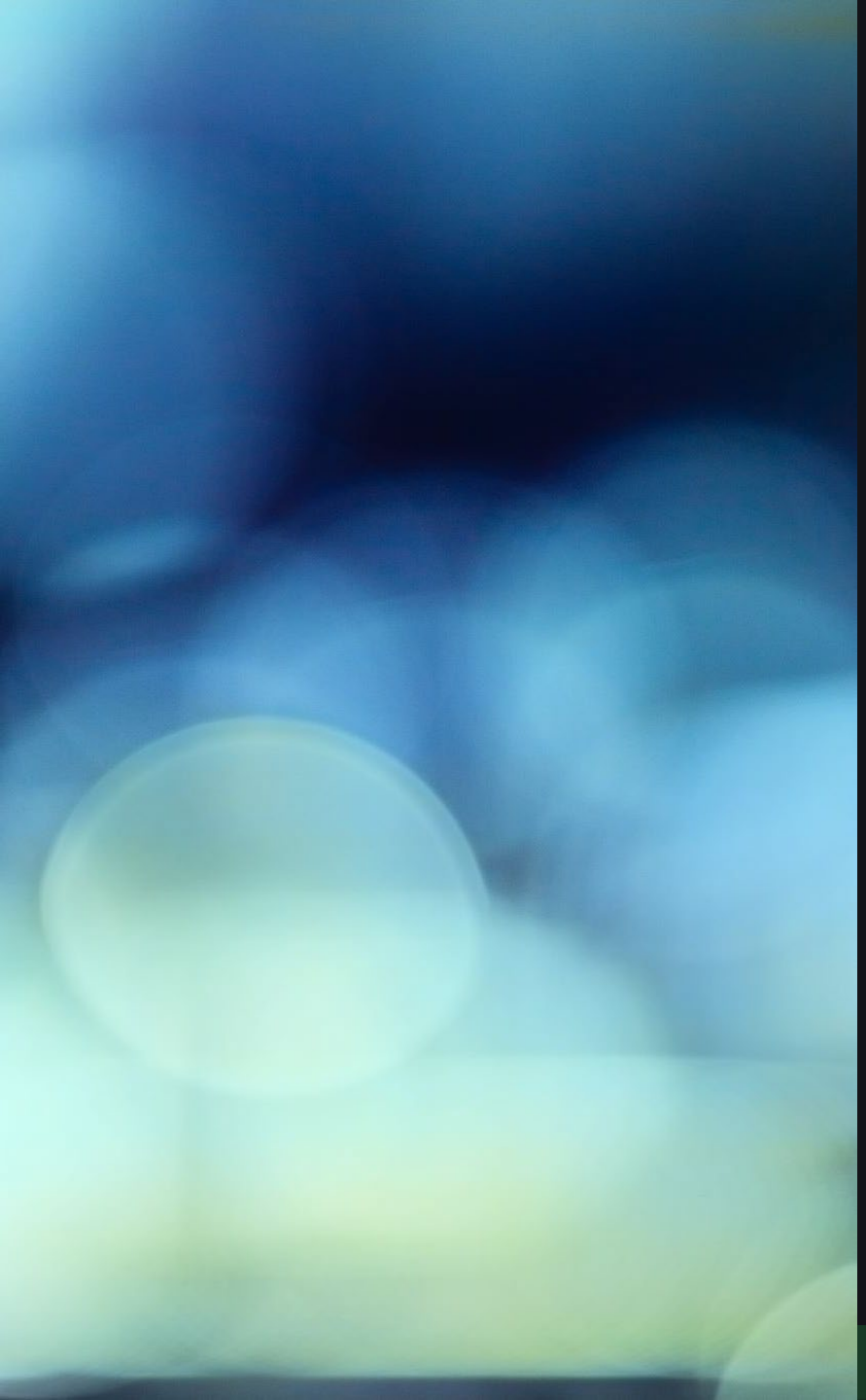
2. Recognize the differences in injuries seen in E-Bike as opposed to Pedal Bike riders.

3. Understand the reasons for the differences in E-Bike injuries as opposed to Pedal Bike riders.

4. Understand the differences in the three types of E-Bikes and the current laws that regulate E-Bikes in California.

5. Develop a personal narrative on how to promote E-Bike safety and local legislation.

6. Understand the difference in policy diffusion and incremental change regarding new legislation.



Significance

Increase in E-Bike crashes

- Consumer Product Safety Commission:
  - 21% increase in injuries in 2022
  - The number of E-Bikes sold > 1million, a 4-fold increase from 2019
  - By 2024, approximately 4 million E-Bikes sold
  - At $1000/ E-Bike this is now a 4 Billion industry

Study Design

- ACS verified Level III-N Trauma Center

- We compared patients presenting to our Trauma Center between January 2019 through July 2025 after E-Bike versus pedal bike (Bike) crashes

- We compared:
  - Age
  - Sex
  - ISS
  - Hospital admission and LOS
  - Helmet use
  - Death

- There were 111 riders of E-Bikes as compared to 1020 riders of Bikes evaluatedduring this study period

E-Bike Classifications

Class 1	Class 2	Class 3
Pedal assisted, no throttle, 20 MPH maximum (easy to alter)	Throttle with Pedal assist, 20 MPH maximum (easy to alter)	Pedal Assisted, no throttle, 28 MPH maximum (easy to alter)
No age limit, no helmet required, legal on any paved surface a conventional bike is allowed	No age limit, no helmet required, legal on any paved surface a conventional bike is allowed	16 years or older, helmet required, no multi-use pathways or sidewalks

Results

	E-Bike	Bike	P-Value
Age (years)	41.7 ± 24.9	48.8 ± 20.0	P=0.0003
Age < 19 years	34%	7%	P<0.0001
Male Riders	70%	80%	P=0.022
ISS	8.2 ± 8.8	7.3 ± 5.9	P=NS

Results

	E-Bike	Bike	P-Value
Hospital Admission	51%	47%	P=NS
Hospital LOS (Days)	5.3 ± 3.2	3.3 ± 3.7	P=0.0004
Helmet Use (Yes)	63%	85%	P<0.0001
Mortality	7%	0.2%	P<0.0001

Injuries After Bicycle Riders Crash

	N	%
Concussion	385	42%
Rib Fractures	154	17%
Clavicle Fractures	139	15%
Facial Fractures	102	11%
Cervical Spine Fractures	89	10%
Pelvic Fractures	57	6%

Summary of Results

1. Riders of E-Bikes presenting to our trauma center between 2019-2025 were significantly younger.

2. There was no significant difference in the ISS of E-Bike as opposed to Bike crash victims.

3. Although there was no significant difference in the percentage of E-Bike riders that required Hospital Admission, there was a significant difference in the Hospital Length of Stay for riders of E-bikes as opposed to Bikes.

Summary of Results

4. There were more women injured as a percentage of E-Bike victims as compared to Bike victims.

5. There were significantly more youth riders in victims of E-Bike as opposed to Bike crash victims.

6. Riders of E-Bikes that crashed were less likely to be wearing helmets.

7. Riders of E-Bikes as opposed to Bikes that crashed were significantly more likely to expire from their injuries.

Recognizing the Dangers

How Do We Move Forward?

Evolution of an Assembly Bill

Identification of the dangers

Analyze and Present Data

Assembly Bill 1778

CDC

Legislation

Assemblymember Damon Connolly, 12th District
AB 1778 – E-BIKE SAFETY AND REGULATIONS
FACT SHEET

BACKGROUND

To ride or drive a vehicle with a motor in California, the rider must be at least 16 years old and possess a valid driver's license. The only exceptions are three classes of electric bicycles. The difference among the three classes is whether they have a throttle. Classes 1 and 3 are "pedal-assisted" electric bicycles, meaning they must be pedaled manually, similar to a traditional bicycle, to propel forward. Class 2 is for "low speed throttled-assisted" electric bicycles. Persons operating electric bicycles are not subject to the provisions of the Vehicle code relating to financial responsibility, driver's licenses, registration, and license plate requirements.

To qualify as a Class 2 e-bike, a throttle bicycle must have a motor less than 750 watts that is "not capable" of providing assistance when the bike reaches 20 mph. If the motor is capable of assisting when the bike is going faster than 20 mph, it does not qualify as a Class 2 e-bike. Vehicles with throttles and top speeds of more than 20 MPH are not "E-Bikes" under California law. They are "Motorcycles" or "Motor Vehicles." Riders must be 16 and have a driver's license.

Manufacturers and distributors of all three classes of bikes must "permanently affix in a prominent location" a label with the "classification number, top assisted speed, and motor wattage of the electric bicycle" VC § 312.5(c). It is illegal for anyone to "tamper with or modify" an electric bicycle "so as to change the speed capability of the bicycle, unless he or she appropriately replaces" the label VC § 24016(d). E-bike riders and passengers under 18 are subject to the same helmet requirement as other bicycle riders and passengers. All of them must wear "a properly fitted and fastened bicycle helmet" that meets government standards VC § 21213(b).

ISSUE

New data from the Marin County Health Department shows that from October 10th to November 10th of 2023, the rate of e-bike-related accidents for youth was nine times higher than similar accidents of people over 20 years old. The report also showed that 22 percent of all 911 calls in the same period were for e-bike-related accidents and 71 percent of responses for all bike accidents among 10- to 19-year-olds were e-bike-related.

Since starting to collect specific data in October, Marin County public health and EMS officials have found that 3 out of every 4 bicycle accidents among school aged children were e-bike related. Physicians have reported that these injuries are not just scraped knees and bruised elbows, but rather, the kinds of injuries you would expect to see in accidents involving higher-speed vehicles, such as internal bleeding, pelvic fractures, damage to vital organs, and brain trauma.

EXISTING LAW

Existing law defines an electric bicycle and classifies electric bicycles into 3 classes with different restrictions. Under existing law, a "class 2 electric bicycle" is a bicycle equipped with a motor that may be used exclusively to propel the bicycle, and that is not capable of providing assistance when the bicycle reaches the speed of 20 miles per hour.

Under existing law, a "class 3 electric bicycle" is a bicycle equipped with a speedometer and a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour. Existing law prohibits a person under 16 years of age from operating a class 3 electric bicycle. Existing law requires a person operating, or riding upon, a class 3 electric bicycle to wear a helmet

THIS BILL

AB 1778 would prohibit individuals under the age of 16 from operating Class 2 electric bicycles. Class 2 e-bikes are operated with a throttle, and are not pedal assisted. While regulated to go no more than 20 miles per hour, too often they are being used at higher speeds with modifications. This legislation targets Class 2 due to the increased risk. They can reach maximum speed much faster than class1 e-bikes, and are more difficult to stop. Setting an age limit will significantly reduce accidents and help ensure our streets remain safe for everyone.

FOR MORE INFORMATION

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AB 1778 SIGNED NOVEMBER 2024

Governor Newsom

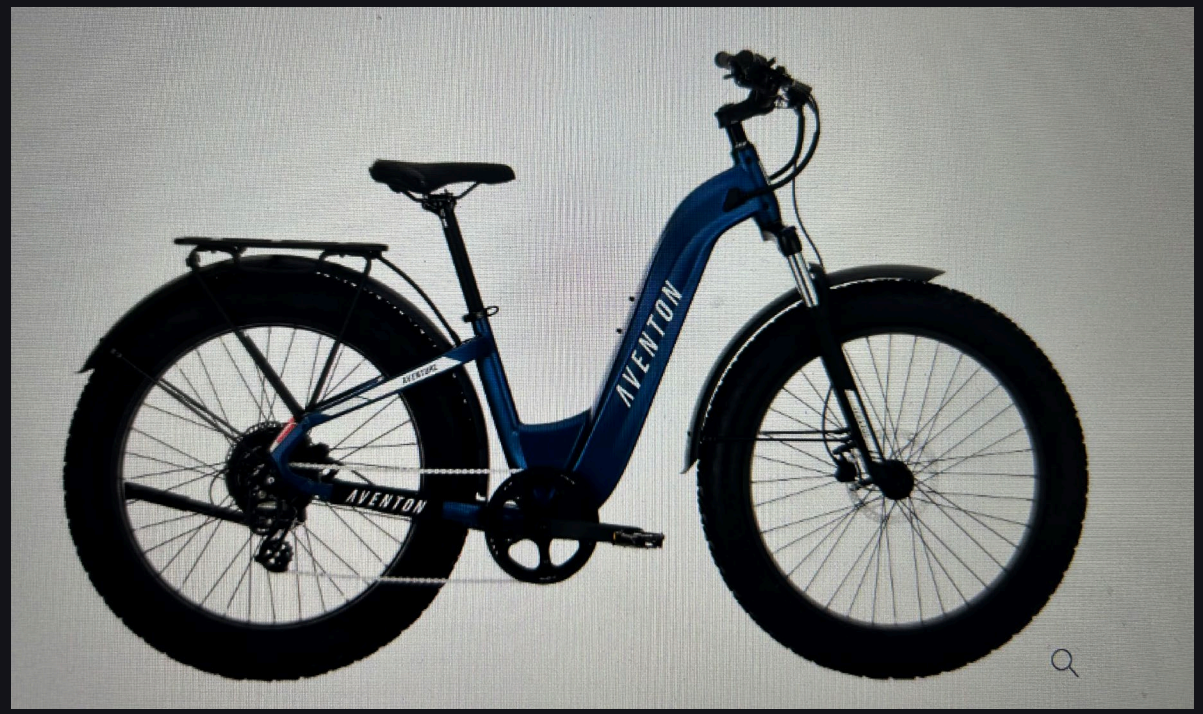
Our Patient Advocate

Before AB 1778 was signed

all city jurisdictions in Marin

opposed implementation

Class 2 E-Bikes



Next Steps

Incrementalism

Amendment to AB 1778

Preemption: 15 US Code 2085

Federal Law that defines a low-speed electric bicycle with operational pedals, using a motor less than 750 watts, capable of speeds under 20 mph

Policy Diffusion

Internal and External influences

Local elected public officials

Community activism with Parents & Pediatricians

Incrementalism

A theory of public policy where decisions are made through small, gradual changes.

The Affordable Care Act is considered the most challenged statue in American History: more than 2,000 legal challenges.

Policy Diffusion

The theory of how policy choices are made in one government jurisdiction

influence choices in other jurisdictions.

Let's start with helmets

Helmet Usage Prevents Serious Head Injury But Not Concussion After Bicycle Riders Crash

7098 injured patients between 1/2007 – 12/2015

906 (13%) injured in bicycle crashes:

- 701 Helmeted (77%) vs. 205 (23%) not Helmeted
  - Mean age 42 yrs
  - Mean ISS 9.3
  - Mean LOS (admitted pts.) 2.7 days
- 683 men (75%) and 223 women (25%)

Helmet Usage Prevents Serious Head Injury But Not Concussion After Bicycle Riders Crash

- Multiple Fractures 139 (15%)
- Internal Abdominal Injuries 46 (5%)
- Femur Fractures 23 (3%)
- Skull Fractures 17 (2%)
- Spinal cord injuries 6 (0.6%)

Helmet Usage Prevents Serious Head Injury But Not Concussion After Bicycle Riders Crash

- No difference in Concussion
- 299/701 (42.6%) vs. 86/205 (42%) p=NS

- Fewer Facial Fractures, Skull Fractures, and Serious Head Injuries (Subdural, Epidural) in Helmeted Riders
- 67/701 (9.5%) vs. 35/205 (17%), p=0.003 (Facial Fx)
- 8/701 (1.1%) vs. 9/205 (4.4%) p=0.003 (Skull Fx)
- 6/701 (0.85%) vs 8/205 (3.9%) p=0.002 (SDH,EH)

Conclusions

- The most common injury in bicycle riders that crash is concussion. Helmets do not prevent concussion when bicycle riders crash.

- Helmeted bicycle riders injured during crashes are less likely to sustain a serious head injury, a skull fracture, or a facial fracture compared to bicycle riders without a helmet.

Long Term Effects of TBI in Children

Short and longer term effects of traumatic brain injury

Rivara FP et al; *Pediatrics Nov 2011; 128: 1129-38.*

- Disability 3, 12, and 24 months after TBI among children and adults.
  - Health related quality of life (QOL) was decreased for all time points in children with moderate or severe TBI.
  - Communication and self-care abilities were all decreased at all time points in children with moderate or severe TBI.
  - Children with moderate or severe TBI have long term reduction in QOL, participation of activities, communication, and self-care abilities.

Policy Diffusion

- Name of the Legislator that advocated for smoking ban on commercial airlines?

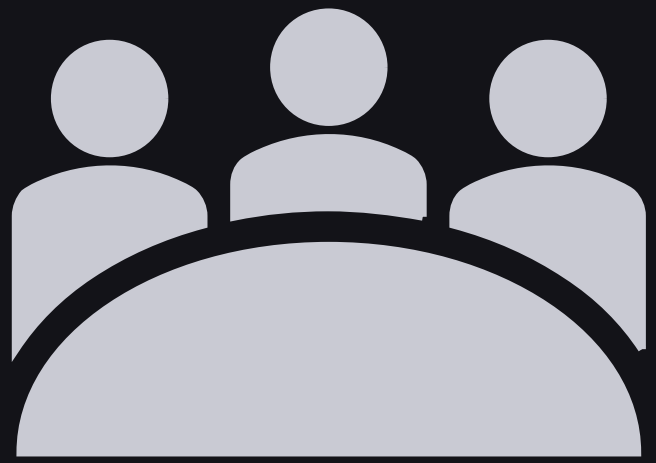
- Name of the Legislator that advocated for child safety seats in cars?

Next Steps
Policy Diffusion

- Name of the Legislator that advocated for smoking ban on commercial airlines?
  - Hint: No Legislators
    - Flight attendants and pilots

- Name of the Legislator that advocated for child safety seats in cars?
  - Hint: No Legislators
    - Parents and pediatricians

How We Can Influence Change



- Internal Influence as opposed to External influence
  - Local municipalities
    - City Council
    - District Boards
    - School Boards
  - Advocates for change:
    - Develop common talking points, identify advocates
    - Parents
    - Pediatricians
    - Emergency Departments
    - Local Media

Collaboration with CDC

- CDC Injury Prevention
  - Identification of the problem
  - Develop method to study data
  - Develop statement
  - Epidemiologic Site Visit Planned for Fall 2025
    - Injury prevention team all terminated March 2025 (DOGE)

Are We Seeing Diffusion?

Britain's illegal e-bike boom: desperation, delivery drivers – and unthinkable danger

PC Harry Rose with some of the City of London's confiscated e-bikes and scooters. Photograph: Sean Smith/The Guardian

E-bikes can legally travel at 15.5mph. But the fastest the police have seized was capable of 70mph. What will stop the rise of these souped-up and potentially fatal vehicles?

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ARE WE SEEING DIFFUSION?

Where We Are Today

Scarlett Johansson SNL 50th Anniversary

Where We Are Today

- Identification of the dangers
- Data analyzed and presented: Data presented 2023
- Assembly Bill 1778 : SIGNED November 2024
- ~~CDC~~
- Next steps
  - Incrementalism
  - Policy Diffusion

Concluding Thoughts

- You are more likely to die if you crash your E-bike as opposed to your pedal bike
- Laws regarding use of E-bikes is lacking leading to serious injuries and death in children and adult riders of E-bikes
- Helmets decrease serious injuries in riders of all bike crashes
- Traumatic Brain Injuries have long term consequences in children
- A simple first step would be to change laws regarding Class II E-bikes

References

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