

# Safety Concerns in Bike-Sharing Systems (BSS)



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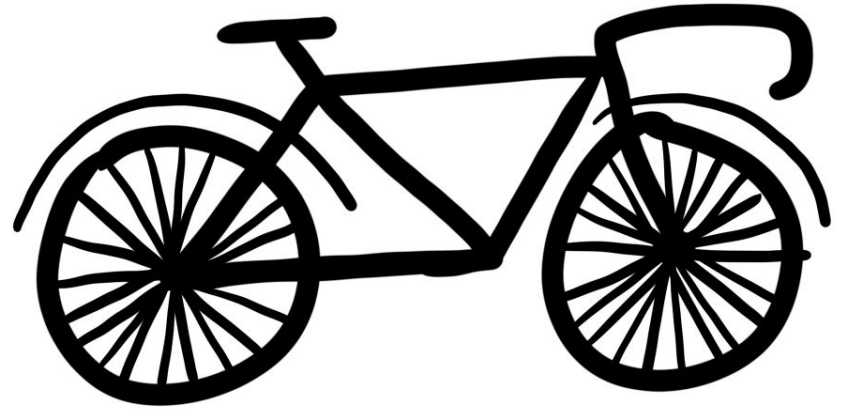
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# Overview

- 1.) Introduction
- 2.) Primary Safety Issues
  - a.) Helmet Usage
  - b.) Bicycle Lanes
  - c.) Turning Lanes
  - d.) Visibility of Cyclists
  - e.) Reckless and Inexperienced Riding
- 3.) Future Research
- 4.) Bigger Picture
- 5.) Conclusion

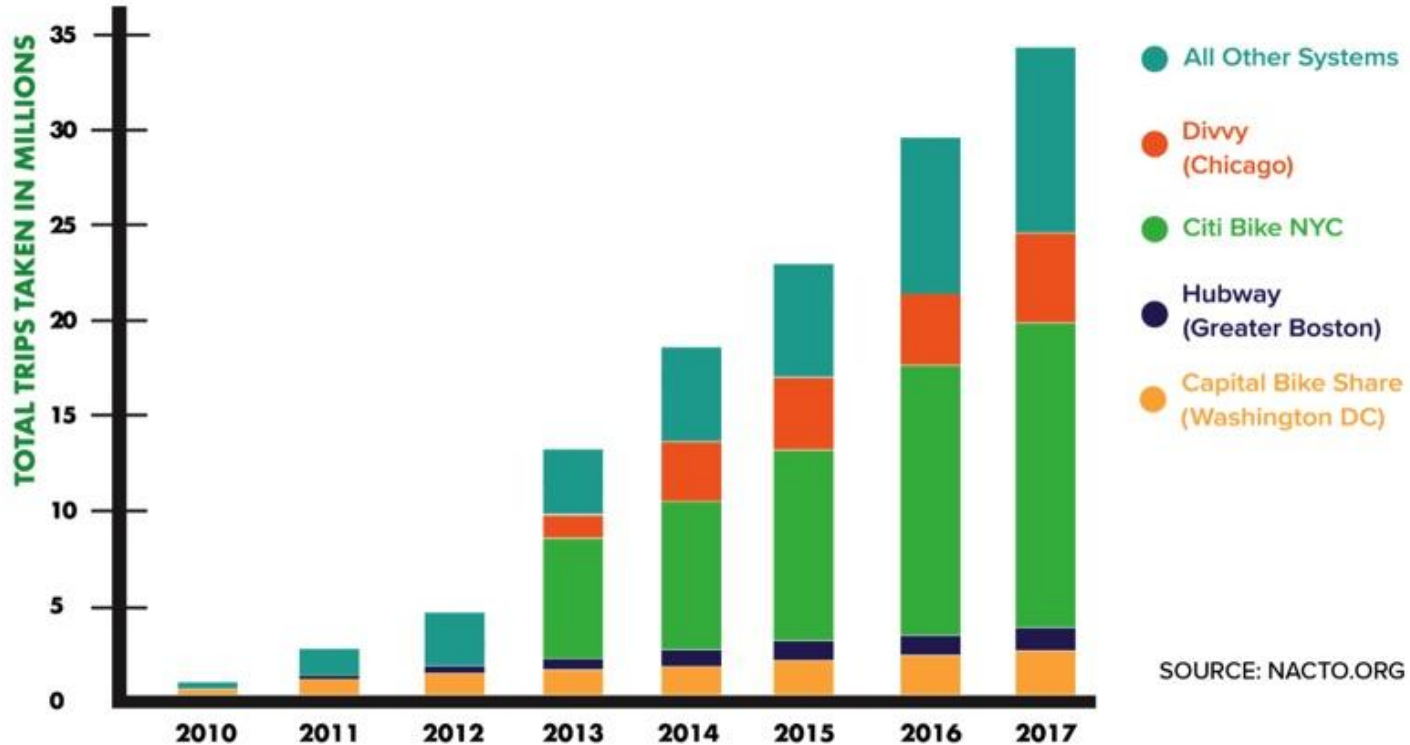


# Benefits of Bike-Sharing Systems

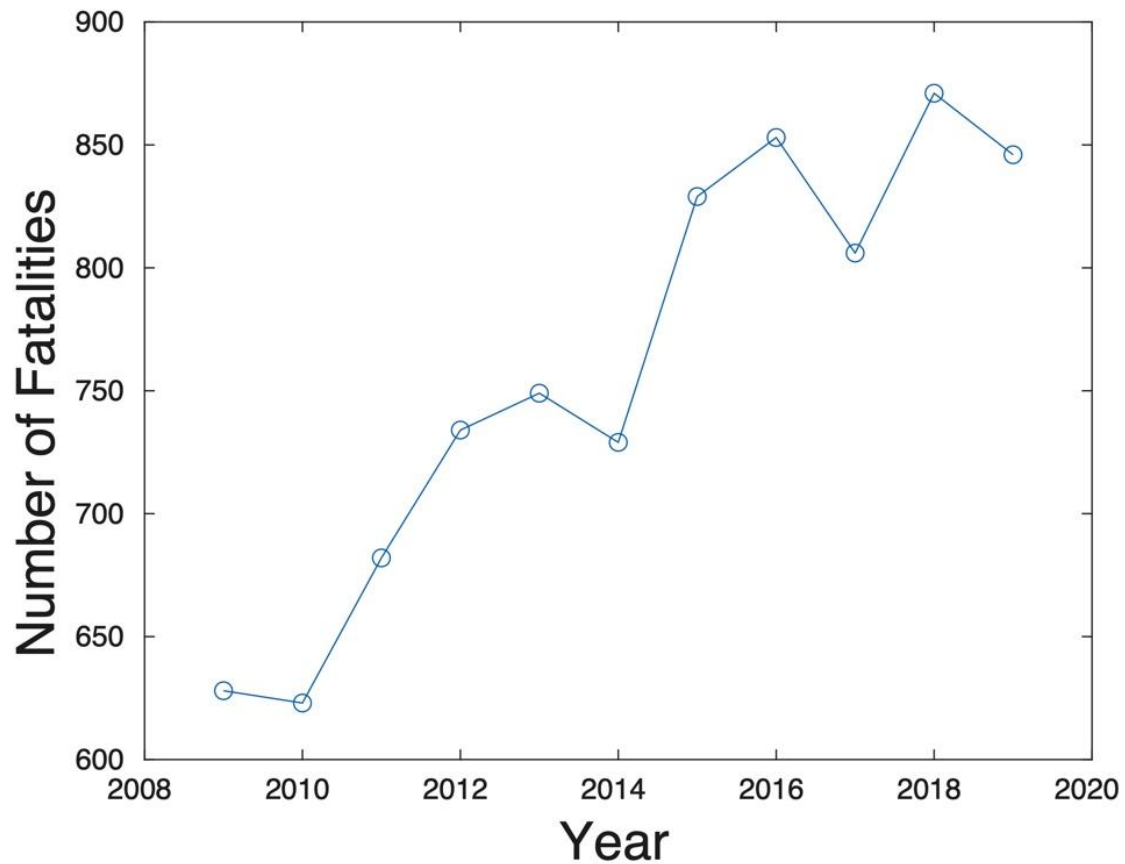
- Solves last/first mile problem
- Environmentally friendly
- Reduces congestion
- Increases physical exercise
- Flexible mode of transportation



# Growth of Bike-Sharing in the US



## Number of cyclist fatalities in the US from 2009 to 2018



# Primary Safety Issues

- Low **Helmet Usage**
- Insufficient **Bicycle Lanes**
- Insufficient Adequate **Cyclist Merging Lanes**
- Low **Visibility of Cyclists**
- **Reckless and Inexperienced Riding**

# Helmet Usage

- Cyclist head injuries make up:
  - 75% of fatalities
  - 33% of emergency room visits
  - 66% of hospitalizations
- Helmets decrease
  - 63-88%
- 151,400 out of 181,150
  - Head injuries could be prevented



# Current Initiatives to Increase Helmet Usage

- Helmet laws
- Helmet fitting events
- Giving away helmets





# BSS Helmet Usage

Helmet Usage in Various Cities

City Name	BSS Helmet Usage(%)	Private Helmet Usage (%)	Helmet Law
London	16	46	n
Seattle	20	91	y
Montreal	12	51	y
NYC	11		y



London, UK



Seattle, USA



Montreal, CA



NYC, USA

# Bicycle Lanes



Shared Bike Lane`



Bike Lane



Protected Bike Lane

# Benefits of Bicycle Lanes

- Decrease Traffic Congestion
- Promote Cycling
- Increase Cyclist Visibility
- Increased Comfort and Safety



# Importance of Turning Lanes

- Collisions between cyclists and motorists increase over 10% at intersections
- Bicycle lanes are forced to merge with motorist traffic lanes at intersections



# Turning Lanes



Cyclist Turn Signal



Bike Box

# Visibility of Cyclists

- Cycling at night is 5 times more dangerous
- 90% of cyclist fatalities occur from collisions with motor vehicles
- Case study showed:
  - 25% of cyclists had front lights
  - 50% had rear reflectors
  - 12% had reflective vests



# Bike Swarm



# Reckless and Inexperienced Riders

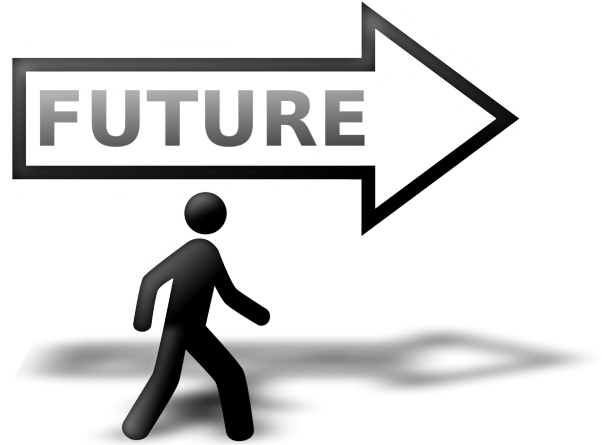


- Highest risk of injury:
  - Young
  - Old
- BSS companies offer:
  - Urban cycling classes
  - Safe riding guides



# Future Research

- 1.) Make helmets more convenient
- 2.) Use helmets as a “key” to unlock bikes
- 3.) Incentivize safe riding



# Bigger Picture



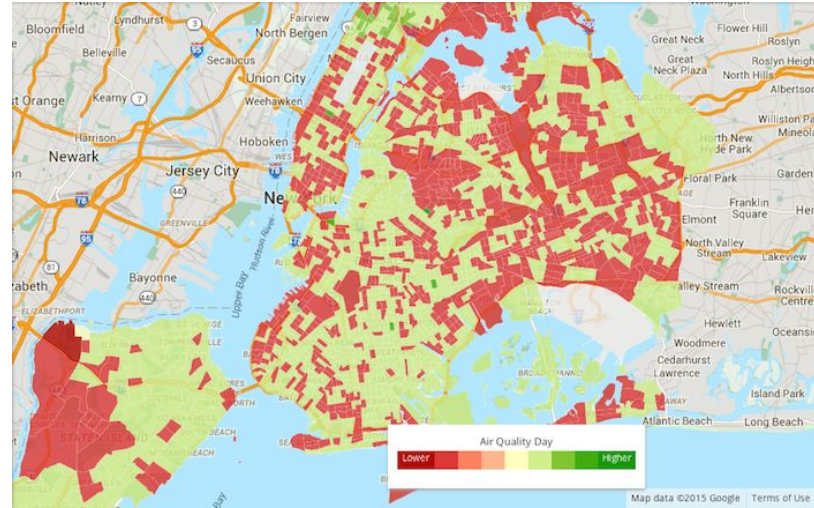
Electric Bicycles



Electric Scooters

# BSS's for Health of the General Public

- Air quality is low in certain parts of cities
- Track air quality through sensors
  - Adds data for each sensor onto google maps
  - Color represents air quality index
- Benefits public health
  - Allows people to plan safe routes



# Conclusion

- Safety would be improved by :
  - Increasing helmet usage
  - Creating more bike lanes
  - Creating more efficient merging lanes
  - Increasing cyclist visibility
  - Encouraging safe riding
  - Educating riders on urban riding



# Questions



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