

Child and youth pedestrian crashes deserve another look: Why and how to do it

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Two sessions coming up on crosswalk marking guidance:

Part 1 – Tuesday, February 15

Preview of the FHWA Crosswalk Marking Selection Guide

Part 2 – Thursday, February 17

Detailed Field Research Findings from the FHWA Crosswalk Marking Selection Guide

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Today's Panel



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Research Center



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City of Philadelphia
Office of Transportation,
Infrastructure and
Sustainability



Child and youth pedestrian crashes deserve another look: Why and how to do it

January 27, 2022





Today's webinar

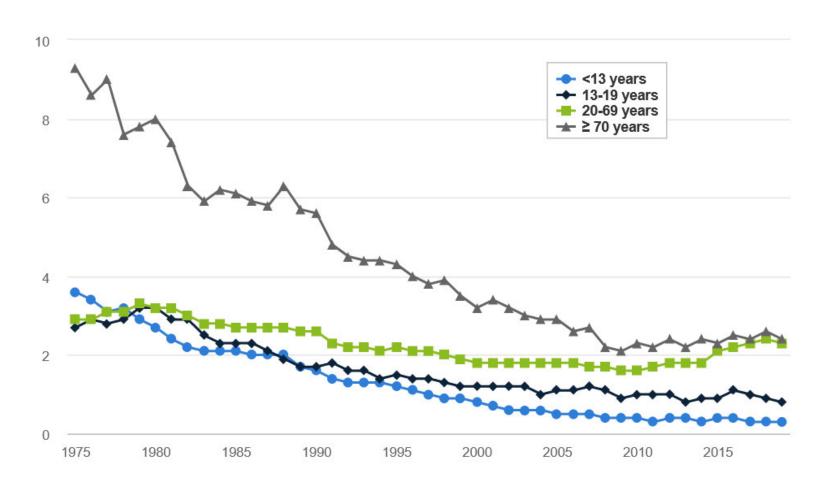
- Child and youth pedestrians,
 Vision Zero for Youth and
 Demonstration Project with
 city of Philadelphia
- 2. Systemic child pedestrian safety analysis
- Philadelphia Vision Zero and experience with focus on youth
- 4. Key takeaways
- 5. Q&A





Child pedestrian deaths declining

Pedestrian deaths per 100,000 people by age, 1975-2019



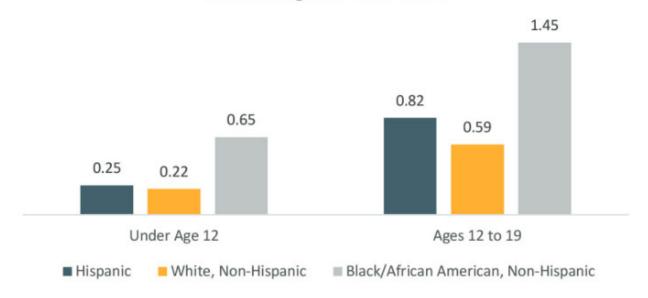
Source: IIHS, https://www.iihs.org/topics/fatality-statistics/detail/pedestrians

Black children, Hispanic children more likely to be killed in crashes than White children

Figure 8. Non-Hispanic Black/African American children were at greatest risk of child pedestrian death in 2017/2018

Fatal Pedestrian Injury Rates per 100,000 by Age Group and Race/Ethnicity, 2-Year Average for 2017/2018,

Children Ages 19 and Under



Safe Kids. (2020). *Child Pedestrian Safety in the US* Available at https://www.safekids.org/research-report/child-pedestrian-safety-us-trends-and-implications-prevention

Vision Zero for Youth Creating safer streets starting where youth walk and bike

- Encourages cities to prioritize places where kids want or need to walk or bike
- Rooted in Safe Routes to School
- Communities demand better for kids
- Can accelerate implementation of large road safety commitments like Vision 7ero

www.visionzeroforyouth.org

Focusing on the Safety of Children Can Propel Vision Zero Initiatives

Today cities and communities across the U.S. are committing to eliminate traffic fatalities and serious injuries, often as part of Vision Zero initiatives. A growing group of these cities are including a focus on improving safe walking and bicycling in school zones and other places where youth are present. There are many reasons why focusing on safety for youth can be an important component. Children and youth need and deserve special protection, and starting with youth can be the spark that builds community support for a broader Vision Zero



Vision Zero is a movement in cities around the world to eliminate traffic death and serious injuries, making cities safe for all road users. To achieve the goal of zero, cities, through

collaboration across multiple agencies, employ a variety of tactics to address the causes of unsafe road conditions. While some communities have developed comprehensive Vision Zero plans, others may be searching for a place to start addressing safety needs.

Starting Near Schools

Starting safety initiatives near schools and in areas where youth often walk and bike, first and foremost creates a safer environment for children. In addition, prioritizing the needs of child pedestrians and bicyclists can form an integral piece of a plan to meet larger safety goals. Safety measures targeted at protecting youth, whether in controlling speed, creating safer, improved walking and biking facilities, or in changing behaviors, have broader effects that benefit entire communities.

Starting in areas where youth walk and bike offers five ways to integrate into broader safety initiatives such as Vision Zero plans.

- 1. Areas around schools provide a logical starting point to employ innovative infrastructure to improve driver behavior and pedestrian safety at crossings.
- 2. Programs for youth create opportunities to try behaviors that inspire community-wide change
- 3. School-zone focused efforts serve as starting points for using strategies to tackle speed that may require more political traction.
- 4. Improving safety where youth walk and bike supports safer walking and biking networks in general.
- 5. Programs that aim to protect children encourage broad support from the community





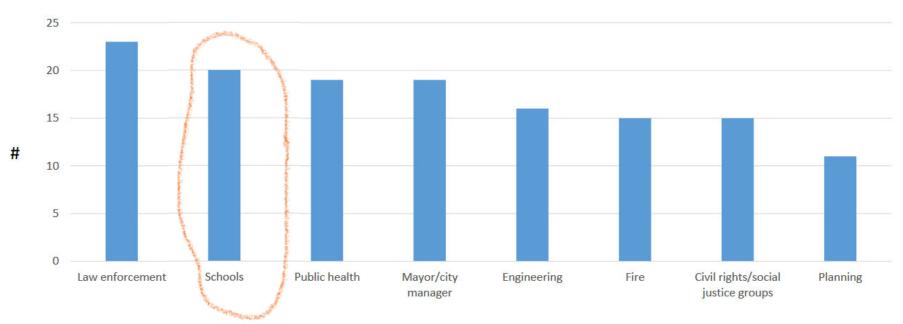
Children and places they walk deserve special attention

- Developmental differences
- Kids like adults may not have other options for how they get around
- Active habits



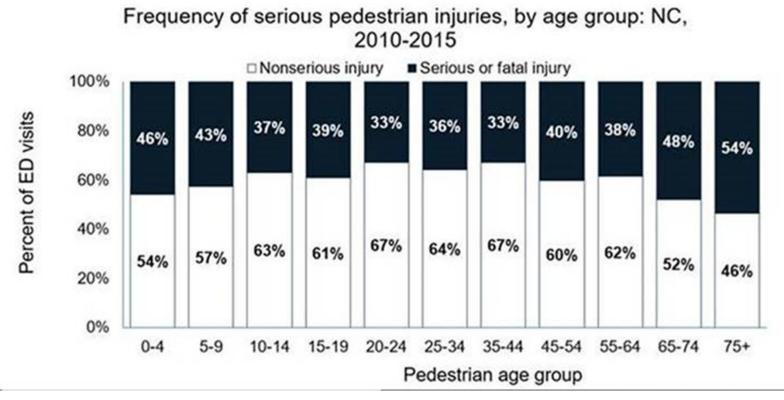
Opportunity: Schools 2nd most frequent partner in Vision Zero plans

Most Frequent Partners on 25 VZ Plans



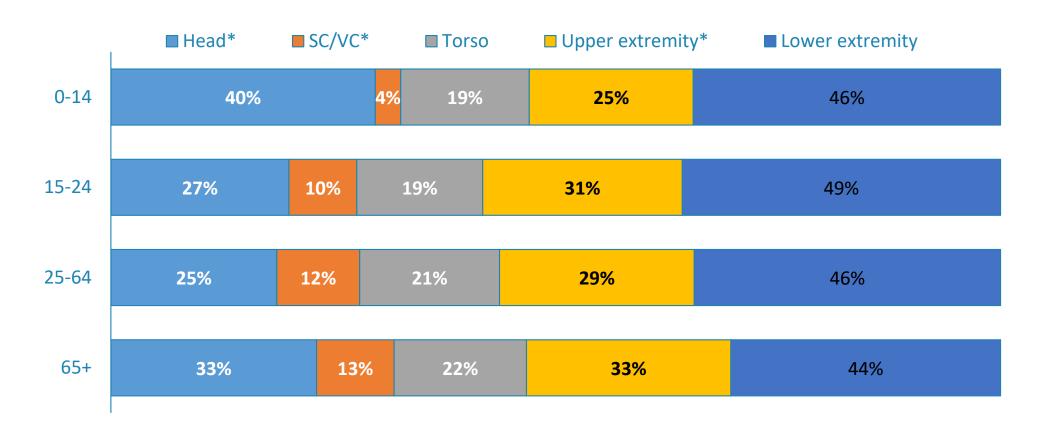
Source: https://www.roadsafety.unc.edu/wp-content/uploads/2020/11/CSCRS SlideDeck R17.pdf

North Carolina child pedestrian crashes Children and older adults more likely to have serious or fatal injury



Katherine J. Harmon, Kari A. Hancock, Anna E. Waller & Laura S. Sandt (2020): Selected characteristics and injury patterns by age group among pedestrians treated in North Carolina emergency departments, Traffic Injury Prevention, DOI: 10.1080/15389588.2020.1829912

Injury location[†]



Abbreviations: SC, spinal column; VC, vertebral column

Katherine J. Harmon , Kari A. Hancock , Anna E. Waller & Laura S. Sandt (2020): Selected characteristics and injury patterns by age group among pedestrians treated in North Carolina emergency departments, Traffic Injury Prevention, DOI: 10.1080/15389588.2020.1829912



^{*}*P*-value = <.05

[†]Patients may have more than one injury; therefore percentages do not sum to 100%.

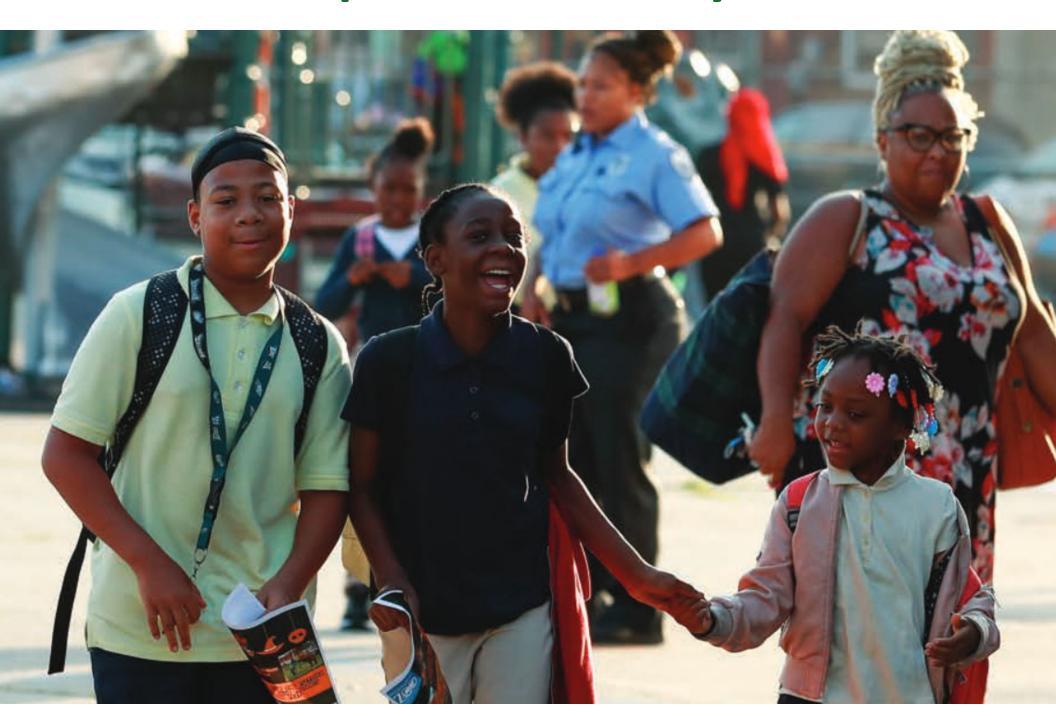
Two-year demonstration project with city of Philadelphia



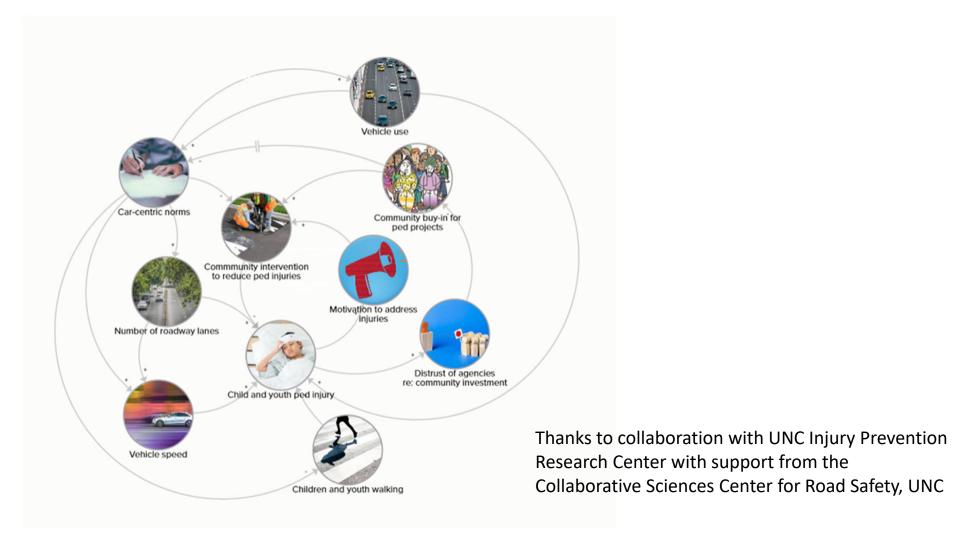
Demonstration Project Components

- Crash analysis
- Suggestions for strategies for Vision Zero update
- Youth pedestrian systemic safety analysis
- Agency partner workshop
- Countermeasure considerations
- Priority location list

Data tells part of the story



Agency partner workshops







Vision Zero for Youth Demonstration Project Team

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Funded by

Federal Highway Administration through

the PBIC



Vision Zero for Youth Demonstration Project

Systemic Analysis of Youth Pedestrian Crashes – City of Philadelphia

Systemic Safety Approach

- Identifies risk factors associated with specific crash types
- Proactively addresses prior crash occurrence
 AND future crash risk
- Aligns with Vision Zero
- Maximizes limited resources through low-cost, rapid-implementation solutions





Systemic Pedestrian Safety Analysis Process

Guided by NCHRP Report 893, Systemic Pedestrian Safety Analysis

Demonstration Project



City of Philadelphia

Source: STEP Studio, Tools for selecting and implementing countermeasures for improving pedestrian crossing safety, FHWA https://safety.fhwa.dot.gov/ped_bike/step/resources/docs/step_studio.pdf

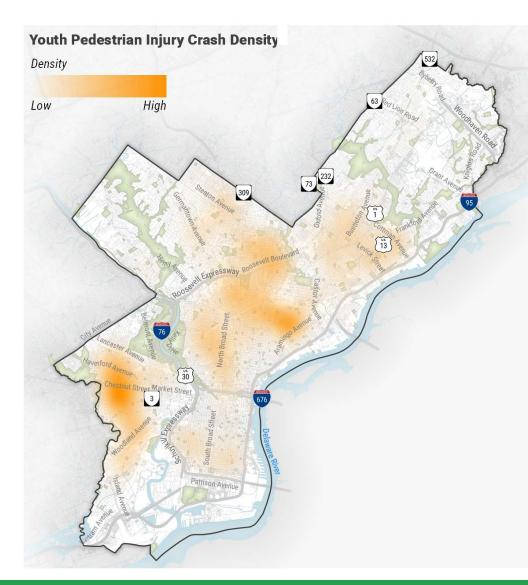


1. Define Study Scope

Youth Pedestrian Crashes (under age 18) 2014 - 2018

2,009* crashes (25% of all pedestrian crashes)

*Able to geo-code 2,002 crashes



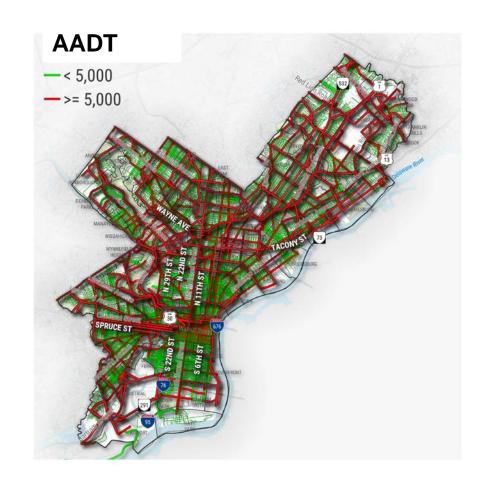


2. Compile Data

Roadway Risk Variable	Risk Threshold
Posted Speed	>25 mph
Average Annual Daily Traffic (AADT)	>=5,000
Multi-lane	>2 lanes bi-directional, >1 lane one-way

Risk variable criteria for demonstration project:

- Associated with pedestrian crashes (research)
- Readily available
- Widely applicable

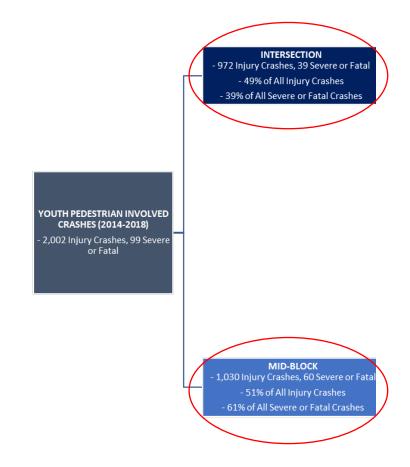


3. Determine Risk Factors

Crash Trees: Location

Youth Pedestrian Injury Crash Location:
49% intersection
51% mid-block

*Approximately 2/3 of adult pedestrian injury crashes occurred at intersections, 1/3 mid-block.





Determine Risk Factors

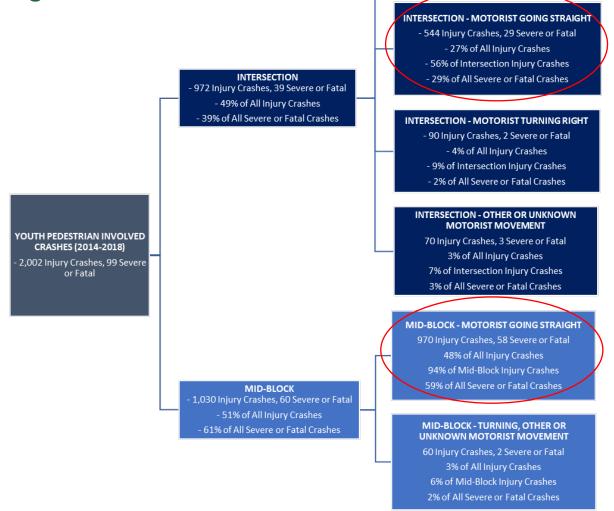
Crash Trees: Location + Motorist Turning Movement

89% of youth pedestrian injury crashes:

- 1. Intersection, motorist going straight 27%
- 2. Intersection, motorist turning left 13%
- 3. Mid-block, motorist going straight 48%

Motorist Going Straight:

- 75% of all injury crashes
- 88% of severe and fatal







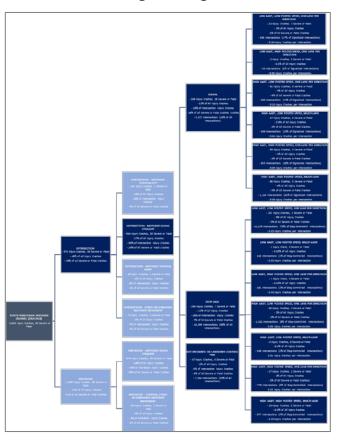
NTERSECTION - MOTORIST TURNING LEFT

268 Injury Crashes, 5 Severe or Fatal
 13% of All Injury Crashes
 28% of Intersection Injury Crashes
 5% of All Severe or Fatal Crashes

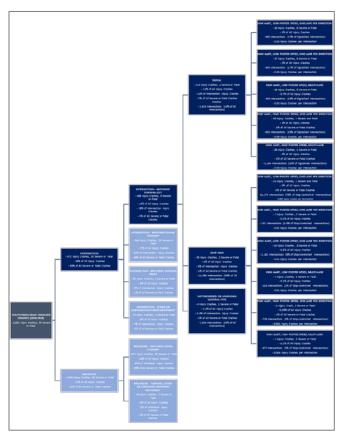
Determine Risk Factors

Crash Trees: Location + Motorist Turning Movement + Roadway Risk Variables

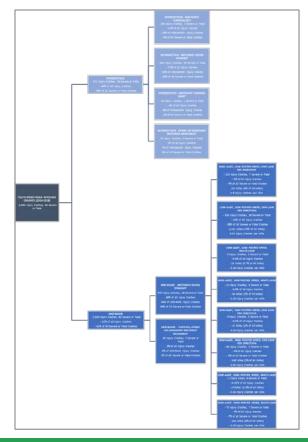
Crash Type 1 – Intersection, Motorist Going Straight



Crash Type 2 – Intersection, Motorist Turning Left



Crash Type 3 – Mid-block, Motorist Going Straight



Determine Risk Factors

Crash Rate Examples

HIGH AADT, LOW POSTED SPEED, ONE LANE PER DIRECTION





- 6% of All Severe or Fatal Crashes

- 595 Intersections (17% of Signalized Intersections)

- 0.10 Injury Crashes per Intersection

61 crashes / 595 intersections = 0.10 crashes per intersection



- 124 Injury Crashes, 7 Severe or Fatal

- 6% of All Injury Crashes

- 7% of All Severe or Fatal Crashes

155 Miles (6% of All Miles)

0.8 Injury Crashes per Mile

124 crashes / 155 miles = 0.80 crashes per mile





Summary of Findings

Key Youth Pedestrian Crash Types and Associated Roadway Risk variables			
Crash Type	High-Risk Locations (Associated Roadway Risk Variables)		

1 Intersection Crashes, Motorist Going Straight

Signalized Intersections, AADT > 5,000, posted speed ≤25mph, one lane in each direction

- Highest associated crash rate per intersection (0.10)
- 61 crashes, 595 intersections

Summary of Findings

	Key Youth Pedestrian Crash Types and Associated Roadway Risk Variables		
	Crash Type High-Risk Locations (Associated Roadway Risk Variables)		
1	Intersection Crashes, Motorist Going Straight	 Signalized Intersections, AADT > 5,000, posted speed ≤25mph, one lane in each direction Highest associated crash rate per intersection (0.10) 61 crashes, 595 intersections 	
2	Intersection Crashes, Motorist Turning Left	 Signalized Intersections, AADT > 5,000, posted Speed >25mph, one lane in each direction Highest associated crash rate per intersection (0.09) 58 crashes, 633 intersections 	



Summary of Findings

	Key Youth Pedestrian Crash Types and Associated Roadway Risk Variables		
	Crash Type High-Risk Locations (Associated Roadway Risk Variables)		
1	Intersection Crashes, Motorist Going Straight	 Signalized Intersections, AADT > 5,000, posted speed ≤25mph, one lane in each direction Highest associated crash rate per intersection (0.10) 61 crashes, 595 intersections 	
2	Intersection Crashes, Motorist Turning Left	 Signalized Intersections, AADT > 5,000, posted Speed >25mph, one lane in each direction Highest associated crash rate per intersection (0.09) 58 crashes, 633 intersections 	
3	Midblock Crashes, Motorist Going Straight	Roads with AADT >5,000, posted speed ≤25mph, one lane in each direction • Highest associated crash rate per mile (0.80) • 124 crashes, 155 miles Also: Roads with AADT <5,000, posted speed ≤25mph, one lane in each direction • 68% of all midblock/motorist going straight crashes (656 crashes) • 38% of all severe or fatal crashes • Crash rate per mile of 0.32 (656 crashes/2,031 miles)	



Youth Pedestrian Crashes and the HIN

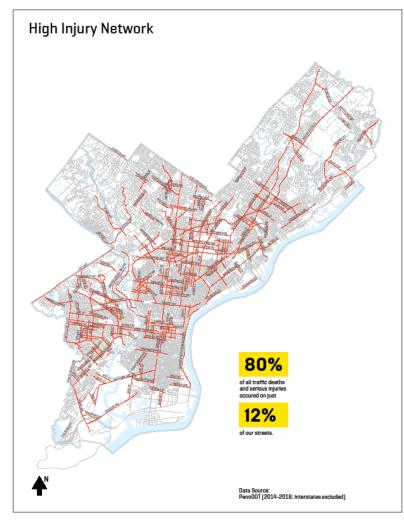
City of Philadelphia Pedestrian Injury Crashes and the High Injury Network		
	% OFF HIN*	
Youth	61%	
Adult	41%	

^{*2014-2018} crashes, 2020 HIN

City of Philadelphia Youth Pedestrian Crash Risk and the High Injury Network

High-risk locations/Crash types	% off the HIN*
Signalized intersections on roads with AADT>5,000, posted speed <25mph, one lane in each direction (Crash type 1)	42%
Signalized intersections on roads with AADT>5,000, posted speed >25mph, one lane in each direction (Crash type 2)	31%
Roads with AADT >5,000, posted speed ≤25mph, one lane in each direction (Crash type 3)	71%
Roads with AADT <5,000, posted speed <25mph, one lane in each direction (also Crash type 3)	97%

^{*2014-2018} crashes, 2020 HIN



City of Philadelphia High Injury Network (2020)

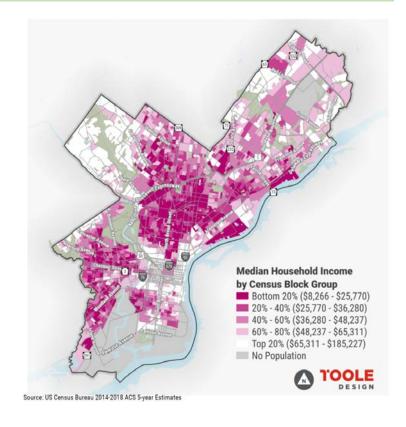


Equity Analysis

What are the relationships between sociodemographic factors and youth pedestrian crashes and crash risk factors?

Eight sociodemographic factors:

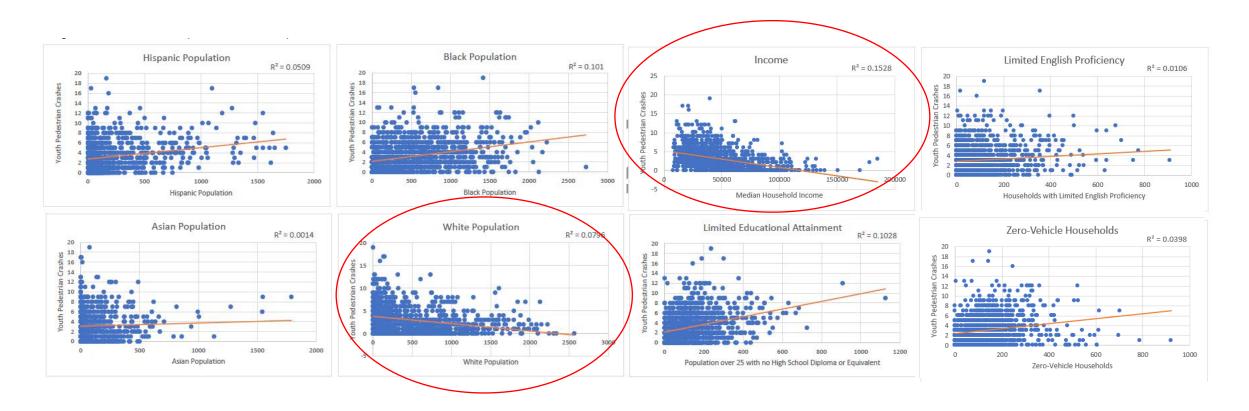
- Black/African American population
- Hispanic/Latinx population
- Asian population
- White population
- Median household income
- Zero vehicle households
- Limited educational attainment*
- Limited English proficiency





^{*} adults over 25 without high school diplomas

Equity Analysis of Youth Pedestrian Crashes



- There are clear disparities between White residents and residents of other races and ethnicities.
- Lower median income areas saw more child crashes and higher median income areas saw fewer.



Equity Analysis of Youth Pedestrian Crash Risk

Equity Analysis of Key Youth Pedestrian Crash Types and Associated Roadway Risk Variables

	Crash Type	High-Risk Locations (Associated Roadway Risk Variables)	Overrepresented Populations
1	Intersection Crashes, Motorist Going Straight	Signalized Intersections, AADT > 5,000, posted speed ≤25mph, one lane in each direction	No distinct demographic patterns
2	Intersection Crashes, Motorist Turning Left	Signalized Intersections, AADT > 5,000, posted Speed >25mph, one lane in each direction	 Hispanic/Latinx population Black population Limited educational attainment Limited English proficiency
3 Midblock Crashes, Motorist Going Straight	Roads with AADT >5,000, posted speed <25mph, one lane in each direction	Zero vehicle householdsBlack populationLimited educational attainment	
		Also: Roads with AADT <5,000, posted speed <25mph, one lane in each direction	 Zero vehicle households Black population Hispanic/Latinx population Limited educational attainment



Identify Potential Treatment Sites

Road Segment Prioritization Criteria for Mid-Block Youth Pedestrian Injury Crashes

Score Category	Maximum Score	Details	
Safety	60 points	 Crash History – 25 points Tier 1: Multiple KSI (25pts) Tier 2: Single KSI and Multiple non-KSI (20pts) Tier 3: Single KSI or Multiple non-KSI (15pts) Tier 4: Single non-KSI (10pts) Exposure (1/10 mile of a school) - 25 points Block length (550-650ft) – 10 points 	
Equity	40 points	Black population – 8 points Latinx population – 4 points Asian – 4 points Limited education attainment – 8 points	Median income – 4 points Limited English Proficiency – 4 points Zero-vehicle households – 8 points

Prioritized Location List – Youth Pedestrian Mid-block Crashes

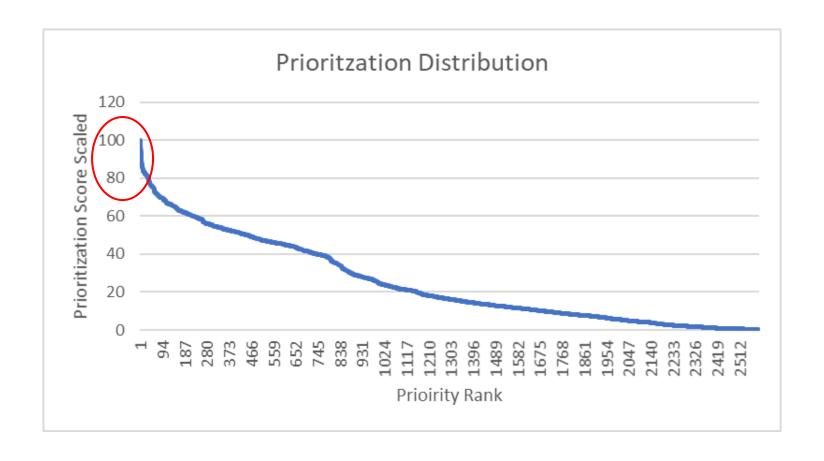
Prioritization criteria applied to road segments with:

- AADT>5,000, posted speed <25mph and one lane per direction (high crash rate) Excerpt shown below
- AADT<5,000, posted speed <25mph and one lane per direction (high crash prevalence)

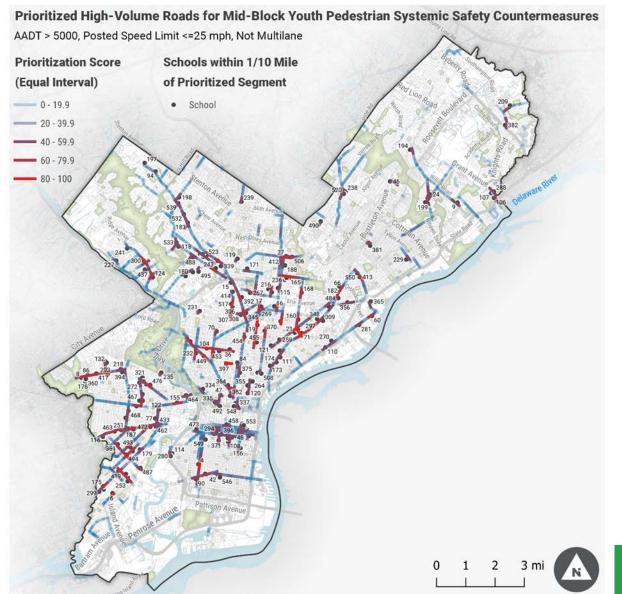
		C	11.	1. 1.6							1		C-1				
id	stname				1_0				r_t_add !							prioritization_score_s	· -
		13879	13622	19134	19134	3200	3298	3201	3299	15380	3200	3200	47.5	20.83	68.33		
		14337	14112	19133	19133	2900	2998	2901	2999	87910	2900	2900	47.5	18.47	65.97		
		15458	15238	19133	19133	2400	2498	2401	2499	87910	2400	2400	47.5	16.74	64.24		
		15238	15005	19133	19133	2500	2598	2501	2599	87910	2500	2500	47.5	16.43			
		24360	24515	19145	19145	1901	1999	1900	1998	88200	1900	1900	45.83	16.79	62.62		
		13894	13627	19133	19133	3100	3198	3101	3199	87910	3100	3100	43.33	18.04	61.37	89.21	6
		14694	14750	19134	19134	2039	2059	2036	2042	23620	2000	2000	45.83	14.04	59.87	86.89	7
		14750	14813	19134	19134	2061	2067	2044	2070	23620	2000	2000	45.83	13.96	59.79	86.76	8
		14652	14694	19134	19134	2023	2037	2022	2034	23620	2000	2000	45.83	13.6	59.43	86.21	9
		14592	14652	19134	19134	2001	2021	2000	2020	23620	2000	2000	45.83	13.34	59.17	85.8	10
		11112	11128	19120	19120	301	333	300	350	85020	300	300	41.67	17.1	58.77	85.18	11
		14279	14336	19134	19134	1801	1813	1800	1806	23620	1800	1800	45.83	12.47	58.3	84.45	12
		14522	14592	19134	19134	1925	1999	1924	1998	23620	1900	1900	45.83	12.29	58.12	84.18	13
		24298	24360	19145	19145	1829	1899	1828	1898	88200	1800	1800	45.83	12.07	57.9	83.83	14
		16946	16937	19121	19121	1600	1618	1601	1619	22010	1600	1600	50	7.81	57.81	83.69	15
		16959	16946	19121	19121	1520	1598	1533	1599	22010	1500	1500	50	7.51	57.51	83.23	16
		16990	16974	19121	19121	1400	1498	1401	1499	22010	1400	1400	50	7.48	57.48	83.18	17
		14838	14750	19134	19134	3052	3098	3019	3099	34960	3000	3000	37.5	19.98	57.48	83.18	18
		18114	17804	19151	19151	1500	1598	1501	1599	88990	1500	1500	43.33	13.95	57.28	82.87	19
		28119	15682	19121	19121	2400	2498	2401	2499	28440	2400	2400	45.83	11.4	57.23	82.8	20
		16974	16959	19121	19121	1500	1518	1501	1531	22010	1500	1500	50	7.19	57.19	82.73	21
		11094	11112	19120	19120	231	299	228	298	85020	200	200	41.67	15.14			
		14336	14375	19134	19134	1815	1825	1808	1810	23620	1800	1800	45.83	10.94	56.77	82.08	23
		11128	11144	19120	19120	335	399	352	398	85020	300	300	41.67	15.06	56.73	82.02	
		23706	23858	19143	19143	2001	2099	2000	2098	88980	2000	2000	47.5	9.23	56.73	82.02	
		24254	24200	10145	10115	4045	4027	4046	4026	00200	1000	4000	45.00	10.05	F.C. 60	94.94	2/

Prioritized Location Distribution

Youth Pedestrian Mid-block Crashes (higher risk locations with AADT>5,000)



Example Maps – Visualize Prioritization Outputs





VISION ZERØ

CITY OF PHILADELPHIA

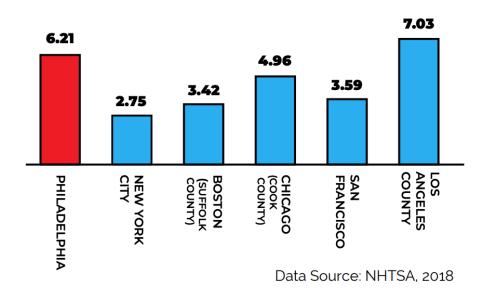






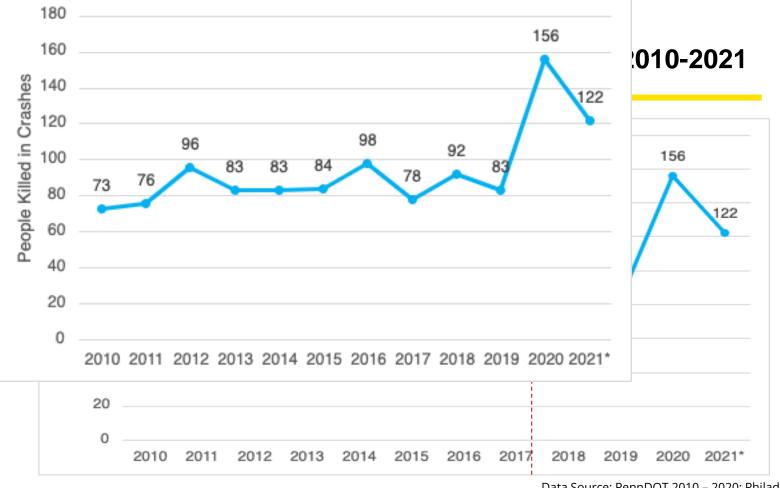
Why Vision Zero in Philly?

Rate of Traffic-Related Deaths
(Per 100,000 Residents)





82% increase in traffic fatalities in 2020



Data Source: PennDOT 2010 – 2020; Philadelphia Police Dept 2021



More than a Statistic



"On July 16, 2013, Samara Banks and three of her four sons lost their lives when hit by two people drag racing on Philadelphia streets. Saamir was in her arms that night, Saasean in his stroller, and Saadeem holding on to the stroller. Samara was a young mother who cherished her kids and loved working with children. She was full of life! Samara's spirit will live on through her one son who survived the crash."

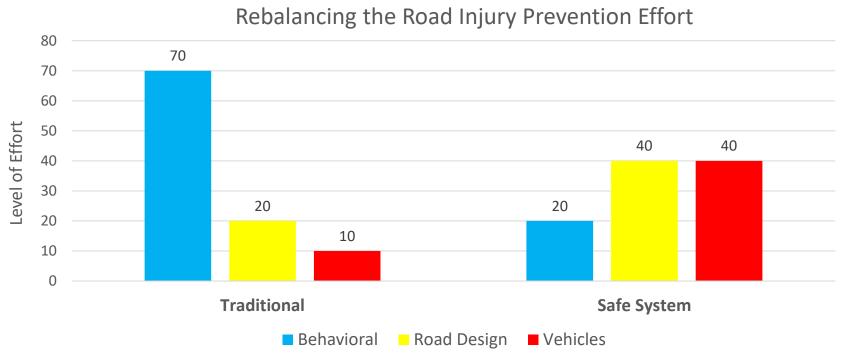
- Latanya Byrd (Samara's aunt)



Vision Zero Action Plan 2025



Vision Zero 2020-2025



Credit: Towards Zero Foundation



High Injury Network 80% occured on just

PennDOT (2014-2018; Interstates excluded)

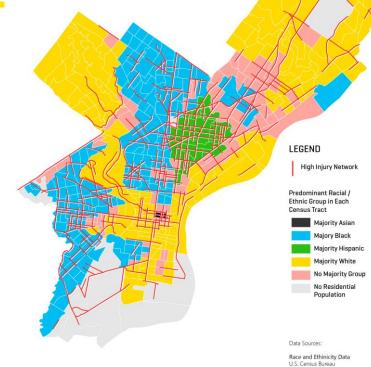
Equity & High Injury Network

Traffic crashes are not evenly distributed

Fatal or serious injury crashes are **30% more** likely to occur in areas of the city where most residents are people of color compared to areas where most residents are

Data Source: PennDOT (2014-2018); ACS (2014-2018)

white.



ACS Data 2013-2017

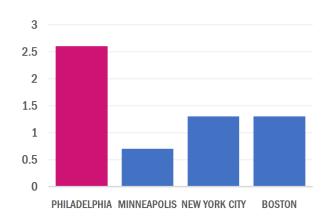
Crash Data PennDOT Crash Data 2014-2018

Pedestrian Safety in Philadelphia

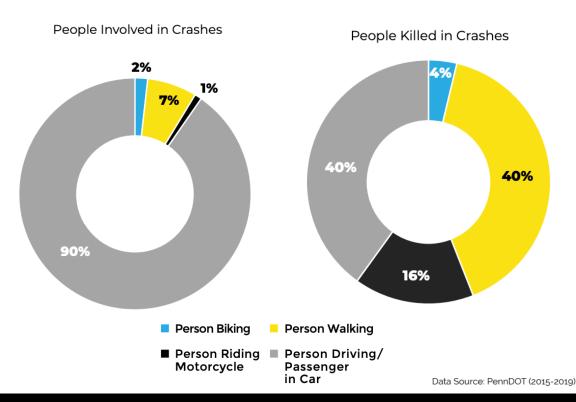


PEDESTRIAN FATALITIES PER 100,000 RESIDENTS IN PHILADELPHIA AND SIMILAR CITIES IN 2018

Philadelphia has a higher pedestrian fatality rate per resident than peer cities.



Source: National Highway Traffic Safety Administration, 2018





Vision Zero for Youth



Demonstration Project



Mayor Kenney signs Vision Zero for Youth statement 2019







Vision Zero for Youth

V Z

Prioritized Schools List

Table 6 lists the top 27 schools for nearby crashes (also shown in Figure 12) and schools with five or more youth pedestrians crashes within one-quarter mile.

Table 6. Descending order of schools with five or more pedestrian crashes (ages up to 17) within 0.25 mile buffer (and by nearest school).

School	Crashes	Address	Latitude	Longitude
UNIVERSAL CHARTER @ DAROFF	19	5630 VINE ST	39.96532797	-75.23283149
SHERIDAN, PHILIP H. SCHOOL	17	800 E ONTARIO ST	39.99957386	-75.114223
Kids World Christian Education Center-				
West Philadelphia	15	100-04 S 61ST ST	39.96054457	-75.24333261
MEMPHIS ST. CHARTER @ JP JONES	14	2950 MEMPHIS ST	39.98616011	-75.11288148
COMEGYS, BENJAMIN B. SCHOOL	13	5100 GREENWAY AVE	39.94051194	-75.21628721
MASTERY CHARTER @ HARRITY	13	5601 CHRISTIAN ST	39.94880916	-75.23581176
CAYUGA SCHOOL	12	4344-4358 N 5TH ST	40.0179501	-75.135019
ELKIN, LEWIS SCHOOL	12	3199 D ST	39.99700992	-75.12127224
LONGSTRETH, WILLIAM C. SCHOOL	12	5700 WILLOWS AVE	39.94090017	-75.23237137
School of Faith in God	12	1680-82 Bridge Street	40.02165155	-75.07544701
UNIVERSAL CHARTER @ BLUFORD	12	5720 MEDIA ST	39.97373093	-75.2360182
ASPIRA CHARTER @ STETSON	11	3200 B ST	39.99872182	-75.12564268
Computer Kidz Christian Academy	11	2243-57 N. 20th St	39.98870858	-75.16512928
Cornerstone Christian Academy	11	1939 S 58TH ST	39.93516278	-75.227418
CRAMP, WILLIAM SCHOOL	11	3449 N MASCHER ST	40.00262104	-75.12993449
G.L.A. CHARTER @ HUEY	11	5200 PINE ST	39.95331885	-75.22685654
KEY, FRANCIS SCOTT SCHOOL	11	2230 S 8TH ST	39.92087512	-75.16050797
OLNEY ELEMENTARY SCHOOL	11	5301 N WATER ST	40.03109318	-75.12087087
63rd St Multicultural Academy of Academic				
Excellence	10	5828 Market St	39.9613075	-75.23791243
BETHUNE, MARY MCLEOD SCHOOL	10	3301 OLD YORK RD	40.0036326	-75.14818259
BOYS LATIN OF PHILA CHARTER	10	5501 CEDAR AVE	39.95171752	-75.23374672
Crystal River Academy	10	6401 LORETTO AVE	40.04037755	-75.07845708
DePaul Catholic School	10	44 W LOGAN ST	40.02710943	-75.16300311
Legacy Christian Academy	10	6208-10 GRAYS AVE	39.92560248	-75.22800412
LOWELL, JAMES R. SCHOOL	10	450 W NEDRO AVE	40.04049054	-75.1288883
MASTERY CHARTER @ CLEVELAND	10	3701 N 19TH ST 7320 TORRESDALE	40.01092415	-75.1587197
St Huberts Catholic High School	10	AVE	40.03134747	-75.03432236



Safe Routes Philly







Neighborhood Slow Zones

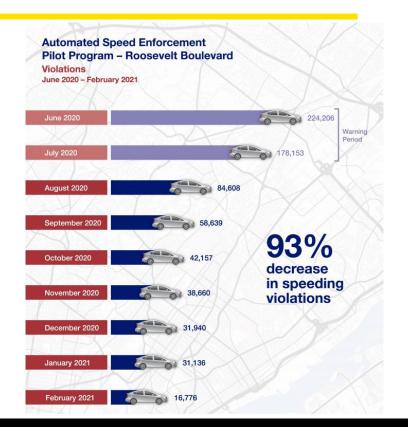






Automated Speed Enforcement







OUR CITY AND OUR FAMILIES DESERVE SAFER STREETS.

Zero traffic deaths by 2030.

Key takeaways

- 1. Children walk in different places and at different times of day than adults.
- 2. For all racial and ethnic populations except the White population, the number of youth pedestrian **crashes increases** as the population in a block group increases. **Lower median income areas** saw more child crashes and higher median income areas saw fewer.
- **3. High injury networks** should be examined to determine if they will sufficiently address child pedestrian crash risks.
- 4. Education, the most common way that children are included in Vision Zero plans, needs to be **coupled with other actions** oriented to a Safe System approach, including changes to the built environment.
- 5. Like pedestrian crashes among adults, child pedestrian crashes occur as a result of range of **interconnected**, **broad factors** that require multi-agency, multi-discipline solutions determined in partnership with community members.





Discussion

- ⇒ Send us your questions
- ⇒ Follow up with us:
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 - ⇒ General Inquiries <u>pbic@pedbikeinfo.org</u>
- ⇒ Archive at <u>www.pedbikeinfo.org/webinars</u>