NATIONAL SAFETY COUNCIL

Position/Policy Statement

Vulnerable Road Users

NSC Policy/Position:

The National Safety Council (NSC) supports transportation policies that incorporate practices – such as improvements to infrastructure, universal helmet laws, and lower speed limits – to protect vulnerable road users, such as pedestrians, motorcyclists, and bicyclists. Vulnerable road users impaired by alcohol and drugs have increased risk of injury and death.

{Recommend updating of references}

Additional Reference for Consideration in Policy Update

Charlebois, D., Anctil, B., Dube, S., Saleh, A., Pierre, G. Chirila, B. & Nahimana, F. (2023). The ideal vulnerable road user – a study of parameters affecting VRU detection, *Traffic Injury Prevention*, *24 (S1)*, 562-567. https://doi.org/10.1080/15389588.2022.2159762

League of American Bicyclists (2020), Driver Education: What States Teach About Biking, https://bikeleague.org/sites/default/files/Driver%20Education%20Draft-2020.pdf

Background:

The term vulnerable road user (VRU) is used mainly to describe those unprotected by an outside shield, as they sustain a greater risk of injury in any collision with a vehicle and are therefore highly in need of protection against such collisions.[1] This broad definition can include (but is not limited to): a pedestrian; a roadway worker; a person operating a wheelchair or other personal mobility device, whether motorized or not; a person operating an electric scooter or similar; and a person operating a bicycle or other nonmotorized means of transportation. Motorcycle operators can also be considered as VRUs due to their lack of vehicle enclosure and higher risk of injury in a collision. This expansive definition should be considered when understanding the scope of those interacting with roadways.

[1] Organisation for Economic Co-operation and Development. Safety of Vulnerable Road Users. (1998) [2]
[2] NHTSA: Pedestrians 2015

Vulnerable road user fatalities have been increasing in the U.S. at an alarming rate. In 2016, there were 5,987 pedestrian fatalities, a 9 percent increase from 2015, accounting for 16 percent of all traffic fatalities.[2] Motorcyclist fatalities exhibit a similar trend, with 5,286 motorcyclist fatalities in 2016, a 5 percent increase from 2015.[2] Bicyclist fatalities, while they make up a smaller proportion of all traffic fatalities, exhibit these increases as well with 840 bicyclist fatalities in 2016, a 1 percent increase from 2015.[3]

If the U.S. is able to eliminate crashes between vehicles and VRUs, over 11,000 lives could be saved each year according to National Highway Traffic Safety Administration (NHTSA) fatality reports.[4] Roadway systems that account for VRUs have the added benefit of providing safe mobility options to the ever-growing aging population and improve social inequities across a variety of indicators. Safe mobility for all aids health, environment, quality of life and reduces isolation.[5][6][8] Given that VRU safety is multifaceted, eliminating VRU fatalities and serious injuries will require a variety of strategies moving forward, including the elimination of existing risks such as impaired, distracted and drowsy driving.

Strategies:

High conflict areas between motorists and VRUs are concentrated in urban and suburban settings. Reducing motor vehicle speed in urban and suburban areas has proven effective at both reducing the number and severity of vehicle-VRU crashes. For example, if a car traveling at 40 mph strikes a pedestrian, the fatality rate for the pedestrian is 50 percent, but if that same collision occurs at 25 mph, the pedestrian fatality rate decreases to 10 percent.[7] More universally, the use of helmets for motorcyclists and bicyclists of all ages has the potential to reduce injury severity in the event of a collision by 69 percent and 60 percent, respectively.[8,9] Infrastructure and roadway design and maintenance will unquestionably need to be considered as well in order to reduce VRU fatalities and injuries.

Examples:

Speed Reduction:

Speed mitigation policies benefit all VRUs. These efforts may include setting speed limits using a Safe System approach,[10] stronger speed limit enforcement and infrastructure measures such as roundabouts, speed bumps and other strategies.[11] Urban and suburban areas, in which pedestrian and cycling traffic is usually higher, especially benefit from lowering the speed limit, which does not require new infrastructure. Even modest speed reductions could prevent many collisions and reduce the severity of injuries to VRUs.[12,13,14] New York City has been successful in reducing pedestrian fatalities, which fell to the lowest level in a century in 2014 and have continued a downward trend when the city adopted new policies as part of its Vision Zero plan. Two effective policy changes were reducing the city's default speed limit from

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[3] NHTSA: Bicyclists and Other Cyclists 2015
[4] NHTSA: Motorcycles 2015
[5] ~~IBID~~ ibid.
[6] Complete Streets Improve Mobility for Older Americans
[7] Identifying Countermeasure Strategies to Increase Safety of Older Pedestrians
[8] U.S. Department of Transportation Equity
[9] Tefft, B. C. (2012, August 27). Impact speed and a pedestrian's risk of severe injury or death.
[10] Liu BC, Ivers R, Norton R, Boufous S, Blows S, et al. Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev*. 2008:CD004333.
[11] Attewell, R. G., Glase, K., & McFadden, M. (2001). Bicycle helmet efficacy: a meta-analysis. *Accident Analysis & Prevention*, 33(3), 345-352.
[12] Towards Zero Foundation: What is the safe system?
[13] Retting, R. A., Ferguson, S. A., & McCartt, A. T. (2003, September). A review of evidence-based traffic engineering measures designed to reduce pedestrian-motor vehicle crashes.
[14] W.A. Leaf and D.F. Preusser (1998), Literature Review on Vehicle Travel Speeds and Pedestrian Injuries, National Highway Traffic Safety Administration, USDOT
[15] Jack Stuster and Coffman, Zail (1998), Synthesis of Safety Research Related to Speed and Speed Limits, FHWARD-98-154 Federal Highway Administration
[16] Per E. Gårder (2004), "The Impact of Speed and Other Variables on Pedestrian Safety in Maine," *Accident Analysis & Prevention*, Volume 36, Issue 4, July, pp. 533-542

30 to 25 mph and increasing enforcement of speeding laws, including the use of automated enforcement.[15]

Boston found similar results after lowering the default speed to 25 mph from 30 mph in 2017. A study by the Insurance Institute for Highway Safety found a reduction in mean speeds, an 8.5 percent reduction in the odds of vehicles exceeding 30 mph and a 29.3 percent reduction in the odds of vehicles exceeding 35 mph. The study concluded that lowering the speed limit was an effective countermeasure for reducing speeds and improving safety.[18]

Helmets:

Multiple studies have proven that the most effective personal protection for motorcyclists, bicyclists and other non-motorized road users is the helmet. Evidence from systematic reviews shows that wearing a helmet reduces the risk of a motorcyclist sustaining a fatal injury by 42 percent and the risk of sustaining any head injury by 69 percent.[16] Helmet benefits to bicyclists are similar, with the risk of head injury decreasing by 60 percent given helmet use.[17] Numerous studies have looked at motorcycle crashes and associated injury outcomes before and after helmet law establishment or reenactment. A majority of studies support universal motorcycle helmet laws, with findings showing significant reductions in the relative risk of fatality after universal helmet laws are put in place.[18,19,20,21,22] Research on the efficacy of cycling helmet laws in the U.S. is limited, but there is some evidence suggesting fewer fatalities among youth in states with cycling helmet laws for young riders.[23]

Helmets play a critical safety role for motorcyclists and bicyclists. Motorcycle and cyclist helmet laws vary widely among the states. Universal motorcycle helmet laws, which require all persons to wear a helmet, are currently in place in 19 states and D.C.[24] Laws requiring only some motorcyclists to wear a helmet – usually determined by a combination of operator age, permit/license type, and insurance coverage – are in place in 28 states. The remaining three states, Illinois, Iowa, and New Hampshire, have no motorcycle helmet laws. No state law requires adults to wear bicycle helmets.[25] In 21 states and D.C., young bike riders (anywhere from age 11 to17 and younger) are required to wear a helmet.

Infrastructure:

Historically, roadway system design has given minimal consideration to VRUs.[26] As a result, optimal conditions for sharing the road with a mix of users does not exist in many situations. This is especially true in urban areas where the increased density of motorists and VRUs creates a greater incidence of interaction between the two groups. Infrastructure and roadway changes can be strategically prioritized to

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[17] Fitzsimmons, E. (2015). New York City's Pedestrian Fatalities Lowest on Record in 2014. The New York Times.
[18] Wen, Cicchino. Lowering the speed limit from 30 to 25 mph in Boston: effects on vehicle speeds.
[19] Liu BC, Ivers R, Norton R, Boufous S, Blows S, et al. Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev*. 2008:CD004333.
[20] Attewell, R. G., Glase, K., & McFadden, M. (2001). Bicycle helmet efficacy: a meta-analysis. *Accident Analysis & Prevention*, 33(3), 345-352.
[21] Ferrando J, Plasència A, Orós M, Borrell C, Kraus JF. Impact of a helmet law on two-wheel motor vehicle crash mortality in a southern European urban area. *Inj Prev.* 2000;6:184–188
[22] Mock CN, Maier RV, Boyle E, Pilcher S, Rivara FP. Injury prevention strategies to promote helmet use decrease severe head injuries at a level I trauma center. *J Trauma.* 1995;39:29–35
[23] Kraus JF, Peek C, McArthur DL, Williams A. The effect of the 1992 California motorcycle helmet use law on motorcycle crash fatalities and injuries. *JAMA.* 1994;272:1506–1511
[24] Fleming NS, Becker ER. The impact of the Texas 1989 motorcycle helmet law on total and head-related fatalities, severe injuries, and overall injuries. *Med Care.* 1992;30:832–845
[25] Muelleman RL, Mlinek EJ, Collicott PE. Motorcycle crash injuries and costs: effect of a reenacted comprehensive helmet use law. *Ann Emerg Med.*1992;21:266–272
[26] Meehan, W. P., Lee, L. K., Fischer, C. M., & Mannix, R. C. (2013). Bicycle Helmet Laws are Associated with a Lower Fatality Rate from Bicycle-Motor Vehicle Collisions. *The Journal of Pediatrics*, *163*(3), 726–729
[27] IIHS – Motorcycle Helmet Use, http://www.iihs.org/iihs/topics/laws/helmetuse/mapmotorcyclehelmets?topicName=Motorcycles#map
[28] IIHS – Bicycle Helmet Use, http://www.iihs.org/iihs/topics/laws/bicycle-laws
[29] Urgo John, Wilensky Meredith, Weissman Steve, Assessing Legal and Liability Barriers to More Efficient Street Design and Functions, https://www.law.berkeley.edu/files/4.1_CREC_codes_and_standards.pdf

address high risks in high vehicle-VRU conflict areas, increasing cost effectiveness.[27] Further, infrastructure improvements, such as traffic calming devices, may be more attractive to municipalities over other methods of VRU protection.

Efforts towards a more forgiving roadway and surrounding infrastructure are an integral part of a Safe System approach to traffic safety and have the ability to decrease risk to VRUs. For pedestrians, sidewalks and refuge islands (Image 1) can protect from collisions with motor vehicles.[28] On-road bike routes as well as off-road bike paths provide the lowest risk for cyclists.[29] While motorcyclists must share the roadway with motorists, roadside infrastructure changes, such as the modification of guardrails (Image 2) to be more motorcycle-friendly, can significantly reduce risk in the event of a crash.[30] These are just a few examples of effective infrastructure countermeasures that improve VRU safety.

Image 1: Example of a refuge island.[31]

Image 2: Example of modified guardrails

[30] Smart Growth America, Complete Streets: Guide to Answering the Costs Question

[31] Retting RA, Ferguson SA, McCartt AT. A review of evidence-based traffic engineering measures designed to reduce pedestrian-motor vehicle crashes. Am J Public Health. 2003;93:1456–1463

[32] Reynolds CC, Harris MA, Teschke K, Cripton PA, Winters M. The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. Environ Health. 2009;8:47

[33] Less-sharp Guardrails Can Save Motorcyclists. (2015, September 14)

[34] National Association of County Transportation Officials, https://nacto.org/publication/urban-bikeway-designguide/intersection-treatments/median-refuge-island/

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This position statement reflects the opinions of the National Safety Council but not necessarily those of each member organization.

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