2023

TRANSPORTATION SAFETY RESEARCH PRIORITIES

Problem Description

Motor vehicle crashes (MVCs) are a leading cause of death in the United States. The economic impact of crash deaths and injuries is substantial, even beyond the immeasurable loss and hardship for families and friends of those killed or injured. Each year, fatal crashes result in about $430 billion in medical costs and cost estimates for lives lost (CDC WISQARS 2022). About half of occupants who died in crashes were unrestrained, and more than one quarter of crash deaths involved alcohol-impaired driving, (NHTSA Summary of Motor Vehicle Crashes 2021). Data limitations prevent calculation of the proportion of crash deaths involving drugs, but drug- and polysubstance-impaired driving is of increasing concern. Additionally, children, teens, older adults, and people from some racial and ethnic minority groups are at particular risk in both urban and rural settings. For example, older adults are more likely to suffer serious injury or death in a motor vehicle crash than younger adults. Widespread implementation of proven strategies (such as mandatory ignition interlocks for all offenders—including first-time offenders, primary seat belt laws that cover all seating positions, child passenger safety laws that require proper car seat and booster seat use until at least age 9) can reduce motor vehicle crashes, injuries, and fatalities.

CDC's mission is to provide public health leadership to advance proven prevention strategies and support a Safe System approach for motor vehicle crash and injury prevention. The comprehensive Safe System approach addresses the needs of all road users through five elements: safer people, safer roads, safer vehicles, safer speeds, and post-crash care. We carry out this mission of reducing injury and death due to MVCs through surveillance, research, and implementation and evaluation of evidence-based programs and policies. Prevention strategies focus on reducing alcohol-, drug-, and polysubstance-impaired driving; improving proper restraint use; increasing safe transportation for older adults; and preventing crashes and injuries among disproportionately affected populations. Research is needed to identify which programs, policies, and strategies are effective with various populations, and which risk and protective factors can account for variations in injuries and deaths across states, Tribes, localities, and territories (STLTs).

Four research priorities were identified to address research gaps.

Research Gaps and Priorities

Objective A: Impaired Driving– Understand differences in and prevention strategies for impaired driving (i.e., alcohol-, drug-, and polysubstance-impaired) especially among populations disproportionately affected by impaired driving.

https://www.cdc.gov/injury/researchpriorities

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

Impaired driving is a major risk factor for motor vehicle crashes. Every day, 28 people die in motor vehicle crashes involving an alcohol-impaired driver (NHTSA Summary of Motor Vehicle Crashes 2021). These fatalities are disproportionately distributed, with the highest death rates among American Indian and Alaska Native persons and persons in rural areas (Letourneau and Crump 2016; NHTSA Summary of Motor Vehicle Crashes 2021). Recent trends are concerning, with rates of alcohol-impaired driving fatalities stabilizing rather than declining (NHTSA Summary of Motor Vehicle Crashes 2021) and drug-involved and drug-impaired driving (which can involve marijuana, other illicit drugs, prescription, and/or over-the-counter medications) potentially increasing. Each year, 20.5 million U.S. residents aged ≥16 years reported driving under the influence of alcohol, 12 million reported driving under the influence of marijuana, and 2.3 million reported driving under the influence of illicit drugs other than marijuana at least once during the past 12 months (Azofeifa et al 2019). Research questions under this priority include:

- What risk and protective factors contribute to differences, disparities, and inequities in driving while impaired and impaired driving fatalities?
- What are the population- and setting-specific barriers and facilitators to not driving while impaired, including among those disproportionately affected by crash deaths involving impaired drivers, such as American Indian and Alaska Native persons?
- In what ways do different substances (e.g., cannabis, opioids) alone or in combination (i.e., polysubstance use) impact driving behaviors and motor vehicle crashes, injuries, and deaths?
- What strategies are effective for the prevention of alcohol-, drug-, and/or polysubstance-impaired driving in the current landscape and what is their impact on health equity. Does their effectiveness and acceptability vary across demographic groups and settings, including among those disproportionately affected by crash deaths involving impaired drivers, such as American Indian and Alaska Native persons.

Objective B: Restraint Use– Examine key factors and effective strategies for increasing consistent and proper restraint use.

While motor vehicle crashes are a leading cause of death nationwide, about half (47 percent) of occupants who die in crashes are unrestrained (NHTSA Summary of Motor Vehicle Crashes). Seat belt and child restraint use is the most effective way to save lives and reduce injuries in crashes (Kahane 2015; CDC Child Passenger Safety 2021)—yet millions of adults and children still do not use restraints on every trip, or they do not use them properly. Restraint use varies significantly by age, race/ethnicity, location, and other factors (West et al 2021b; Shults et al 2021). As age increases among children and youth, restraint use decreases. Compared with other age groups, teens and young adults often have the lowest seat belt use rates (Enriquez 2021). Increasing restraint use will reduce motor vehicle injuries and deaths.

In addition, there are racial/ethnic and geographical differences in motor vehicle crash injuries and deaths (Beck et al 2017; West et al 2021a). For instance, a larger proportion of total deaths among American Indian and Alaska Native and Hispanic populations are attributed to crashes as compared with other racial/ethnic groups (West and Naumann 2013; CDC WISQARS 2022). The rate of motor vehicle traffic deaths on rural roads is twice that of urban roads (Beck et al 2017). Therefore, research to identify effective strategies for increasing restraint use, especially among populations at increased risk, is needed. Research questions under this priority include:

- How do those who never, sometimes, and always use seat belts differ by characteristics such as age, sex, race/ethnicity, geographic location, seating position, and reasons for using seat belts?
- What are barriers and facilitators to consistent restraint use among sub-groups of the population at higher risk of inconsistent restraint use (e.g., teens/young adults, people living in rural areas, people of certain races/ethnicities)?
- What unique risk and protective factors, as well as the population- and setting-specific barriers and facilitators (e.g., child restraint laws), contribute to health inequities in premature graduation (e.g., prematurely moving from a booster seat to a seat belt) for child passengers, and how do these differ among sub-groups of the population and social determinants of health (SDOH)?

Objective C: Older Adult Mobility– Identify risk and protective factors and effective strategies for reducing transportation-related injuries among older adults while preserving their mobility and increasing safe transportation.

In the past decade, the number of Americans aged 65+ increased from 39.7 million to 54.1 million, representing a 36 percent increase. In comparison, the population in the United States younger than 65 only grew by 3 percent (ACL 2021). Mobility, the ability to get where one wants to go, when one wants to go, and how one wants to get there, is important for quality of life, access to healthcare and other services and goods, social connectedness, and maintaining independence (Satariano, et al 2012; Chihuri et al 2016). Prevention of crashes and falls are both important for maintaining mobility as people age. The public health burden of these injury causes is substantial: crashes and falls are the two leading causes of unintentional injury death for adults aged 65 years and older (CDC WISQARS 2022).

For adults, including older people, the primary means of getting around in the United States is by driving passenger vehicles (Shen et al., 2017). Nearly 86 percent of older adults (aged 65+ years) have a driver's license (ACL 2021; FHWA 2021). Motor vehicle crashes are of particular concern for older adults as they are more likely to be injured or die when a crash occurs (CDC 2022; Cicchino 2015). However, driving cessation is associated with adverse health and quality of life outcomes including depression, poorer health status, cognitive decline, social isolation, higher risk of entry into long-term care facilities, and higher risk of mortality from any cause (Chihuri et al 2016; Edwards et al 2009). These adverse health outcomes point to a critical need to identify alternatives to driving that can help older adults maintain their mobility and achieve equitable access to (safe) transportation. Given the public health burden of both crashes and falls among older adults, understanding shared risk and protective factors for falls and crashes could help identify effective strategies to reduce these injuries. Research questions under this priority include:

- What are the risk and protective factors for MVC injury among older adults, and how do these differ among sub-groups of the population, including but not limited to race/ethnicity, health conditions, and road user type?
- What risk and protective factors contribute to health inequities in access to transportation among older adults, and how do these differ among sub-groups of the older adult population and by social determinants of health (SDOH)?
- Among older adults, what are the shared, modifiable risk and protective factors for MVC and fall injuries and how do these vary and contribute to health inequities by age, sex, race/ethnicity, SDOH, or location? How can these shared factors be used to inform future prevention activities to improve health equity for both MVC and fall injuries?
- To what extent are healthcare providers aware of and willing to recommend strategies (e.g., medication safety) that promote older driver safety?

Objective D: Emerging or Evolving Trends– Better understand risk factors for new, emerging, or evolving trends in transportation safety including prevention of pedestrian injuries and deaths.

In the past decade, deaths have been increasing among some types of road users. For example, the number of traffic-related pedestrian deaths has increased by nearly 60% over the past decade (CDC WISQARS 2022). Similarly, age-adjusted pedestrian death rates have increased by 46% during this same period (CDC WISQARS 2022). Nearly half of crashes that resulted in a pedestrian death involved alcohol. People aged 65 years and older accounted for over 20% of pedestrian deaths. Additionally, nearly one in five children under the age of 15 who were killed in crashes were pedestrians (CDC WISQARS 2022). With the increasing numbers of pedestrian deaths in the last decade, these deaths now account for a greater proportion of all traffic deaths. Pedestrians now represent 1 in 6 (17%) of all traffic deaths.

Certain groups (including people who are minorities, immigrants, and who have low incomes) are overrepresented in pedestrian deaths (Countermeasures that Work, page 8-3). CDC supports the Safe System approach to address

transportation safety, including pedestrian safety. Proven strategies known to reduce pedestrian deaths and injuries (e.g., reducing vehicle speeds) often require engineering measures and creating and enforcing traffic safety policies (Countermeasures that Work; FHWA Proven Countermeasures; Safe Systems). There is a need for research to describe the effects of engineering and pedestrian enforcement programs on the safety, mobility, health, and well-being of various populations. It is important to monitor trends in transportation safety among sub-groups of the population and different types of road users to identify increasing burden as it arises and ensure that health equity is achieved/addressed.

Research questions under this priority include:

- What risk and protective factors explain MVC-related pedestrian injury rates?[1]
- To what extent does the implementation of traffic safety policies and roadway design countermeasures (e.g., crosswalks, roundabouts, variable speed limits, etc.) consistent with a Safe System approach positively or negatively impact equity?
- What are the barriers to the implementation of traffic safety policies and roadway design countermeasures consistent with a Safe System, and do these barriers vary based on community social determinants of health?
- How do SDOH impact pedestrian death rates and how do SDOH relate to pedestrian-related health inequities?

[1]Involves working with partners, including the National Highway Traffic Safety Administration (NHTSA), to link crash data and injury health data.