

Research Matters

Highlights of Recent Injury Research

Prepared by the Society for Advancement of Violence and Injury Research (SAVIR) Science and Research Committee

In the United States, injuries are the leading cause of death for people between the ages of 1 and 44,¹ and generate \$406 billion in medical care and lost productivity costs annually.² Although injuries account for more years of potential life lost before age 65 than cancer and heart disease combined, federal research support for injury falls far behind that allocated for either of these conditions. In FY 2012, federal funding for cancer research through the National Cancer Institute totaled over \$5 billion and funding for heart disease research through the National Heart, Lung, and Blood Institute exceeded \$3 billion.³ In contrast, the Centers for Disease Control and Prevention's National Center for Injury Prevention and Control, the lead federal agency for injury and violence prevention, received \$168 million.⁴ NICHD is the only NIH institute that has a branch devoted to trauma; however, it only has 4 people in it.

Through research, new knowledge can be acquired and applied to improve health and save lives. Injury and violence researchers conduct scientific studies that provide the evidence needed to develop and implement programs and policies that will decrease death and disability due to injury. Scientific research on injury prevention includes studies that 1) define a problem; 2) identify risk and protective factors; 3) develop and evaluate prevention strategies, and 4) translate effective approaches to communities to ensure wide utilization. This document includes summaries of 51 recent injury research publications and is organized around six injury priority areas: transportation safety, falls, traumatic brain injury, violence, suicide and prescription drug safety. This list is not exhaustive, but these research examples illustrate the potential for the strong and lasting impact of injury science. Three types of research examples are highlighted: first, studies that demonstrate impact on programs and policy; second, studies that are considered to be "landmark" because of their potential to transform how we control and prevent injuries in the near future, and third, innovative new research identifying emerging public health issues in injury and violence prevention.



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Transportation safety research informs a multitude of life-saving strategies.

Given that motor vehicle crashes (MVCs) are a leading cause of death and injury, particularly in children,¹ transportation safety is a key area for research. Studies provided a foundation to inform engineering, interventions and policy decisions that saved lives on the roads.

- Injury researchers found that low cost traffic engineering measures (such as speed humps) are associated with a significant reduction in MVCs.⁵ Research evaluating vehicle design found that side airbags substantially reduce fatality risk in cars.⁶ Similarly, an analysis evaluating the effect of highway safety legislation demonstrated major life-saving benefits from airbag, seatbelt use, and impaired driving laws.⁷ Additional successful interventions include ignition interlocks, which were associated with large reductions in re-arrest rates for alcohol-impaired driving,⁸ and motorcycle helmet use and mandatory use laws, which is associated with reduced fatalities, injuries and related economic costs.⁹
- Multiple analyses demonstrated that graduated driver licensing laws (which allow young drivers to incrementally acquire experience) are effective in reducing crash rates among young drivers.¹⁰⁻¹³
- Ongoing research continues to provide information about injury risk, which can inform new approaches to improve road safety. Injury researchers found gender-related differences in risk for teen drivers; specifically, passengers may affect male teen driver crashes through distraction and risk-promoting pathways, and female involvement primarily through distraction.¹⁴ An evaluation of two forms of feedback on risky driving events using in-vehicle technology found that provision of feedback with possible consequences associated with parents being informed reduced risky driving, whereas immediate feedback only to teenagers did not reduce risky driving.¹⁵
- Research has responded to new challenges to safety, such as texting and cell phone use. A summary of 28 experimental studies concluded that texting (typing and reading text messages) while driving compromised the safety of the driver, passengers and other road users, especially in young drivers who often use these technologies while driving.¹⁶
- Other injury studies have described new public safety hazards, including distracted pedestrian behavior¹⁷ and intoxication among moped drivers,¹⁸ as well as inconsistencies



in availability of passenger safety resources for children discharged from emergency departments following a MVC.¹⁹

Diverse approaches reduce falls and related injuries.

Falls are a leading cause of nonfatal injuries in both adults and children,¹ although different prevention strategies are needed for each population.

- Based on previous research linking vitamin D status with balance and muscle function, which are implicated in falls in older adults, vitamin D supplementation was evaluated in elderly populations and found to reduce falls in both residents of care facilities and community-dwelling people.^{20,21}
- Similarly, fall-prevention exercise programs, usually including muscle strengthening and balance retraining have been associated with a reduction in falls in older adults.²¹
- Other successful programs informed by injury research include home safety interventions and individually targeted multifactorial interventions, both of which were associated with fewer falls in at-risk older adults.²² Injury research focused on falls in the elderly has continued to better define factors associated with risk, such as the lack of accessibility features in homes.²³
- Other research has focused on the prevention of falls from playground equipment, a common cause of injury in children. To prevent these falls, engineering studies of equipment design are important to evaluate safety standards. An innovative study evaluated a model to test rung and rail design of a playground bar, finding it to be a safe and feasible method to assess design for playgrounds.²⁴

Understanding concussion risk and outcomes provides a foundation for prevention.

Traumatic brain injury (TBI) is a common occurrence in the United States, with approximately 2.5 million TBIs occurring annually, either as an isolated injury or along with other injuries. One-third of people who die from injuries have a TBI.

Approximately 75% of TBIs are concussions.²⁵ Injury research focuses on improving our understanding of risk as well as outcomes related to TBI.

- Key studies determined that concussions occur across a wide variety of sports²⁶ and elucidated the characteristics of recurrent concussions compared to new concussions.²⁷ Research also showed that the types of symptoms reported from sport-related concussion differ between sexes,²⁸ which has important implications for diagnosis.



- Studies identified risk factors for concussive symptoms lasting more than one week,²⁹ which can potentially be used to predict injury outcomes and design evidence-based return to play guidelines for athletes.
- Research focused on better understanding the role of neurocognitive testing in the management of sport-related concussion³⁰ and identifying the factors that may influence the timing of return to play.³¹
- Risk reduction strategies in sport-related concussion require a multifactorial approach.³² Such knowledge has informed evidence-based clinical practice summaries and has been translated into legislation and policy-related efforts to prevent concussion.³³⁻³⁶

Violence research defines the problem and informs promising interventions

Each year, millions of people experience the physical, mental and economic consequences of violence.³⁷ Injury researchers have been instrumental in defining the problem and identifying risk and protective factors, and creating the evidence base for prevention of violence.

- Analysis of national datasets developed model procedures for public health surveillance of abusive head trauma among children^{38,39} and demonstrated that socioeconomically disadvantaged families with children under 1 year of age are an important focus for primary prevention efforts.⁴⁰
- Studies of assault-injured youth treated in the emergency department (ED) identified a high rate of firearm possession (23.1%)⁴¹ as well as the association between daily substance use and dating violence.⁴² High rates of dating violence exposure (20%) were also found in adolescent males in the ED setting.⁴³ Such studies provide needed data to inform interventions to identify and assist at-risk youth.
- Innovative biological research uncovered DNA changes in children who were exposed to violence. These children showed significantly more telomere erosion from 5 to 10 years of age in comparison to peers who were not exposed to violence.⁴⁴ These findings provide support for a mechanism linking cumulative childhood stress to the chronic illness in later life.
- Studies identified protective factors for at-risk African American youth; these include future orientation (the degree to which one is thoughtful about the future)⁴⁵ and the engagement of nonresident fathers.⁴⁶ These data support the inclusion of these components in intervention research in violence prevention.
- A systematic analysis of the effect of physical punishment of children concluded that parents should be supported in learning nonviolent, effective approaches to discipline, which can reduce their use of physical punishment.⁴⁷



- Injury researchers found promising results in community-based interventions. “Hot spots policing” is associated with a reduction in crime⁴⁸ and the greening of vacant lots is associated with a reduction in gun-related violence.⁴⁹
- Similarly, injury researchers found that an ED-based brief motivational interviewing intervention was associated with a reduction in moderate and severe dating victimization for up to 1 year in at-risk adolescents.⁵⁰ This computer-based intervention could have important public health effects on the lives of at-risk adolescents.

Suicide prevention research supports the use of media reporting guidelines

Suicide is a global health issue, claiming more than 800,000 lives each year.⁵¹ While suicide results from a variety of factors, there is convincing evidence that the media have a powerful influence over those at risk and media reports may be associated with increased suicidal behaviors.

- Injury prevention researchers systematically evaluated the evidence concerning the use and effectiveness of media guidelines for reporting on suicide. Findings suggest that media guidelines can be effective in both reducing imitative suicide and changing reporting behavior. Although journalists’ use of guidelines is generally low, increasing use of guidelines may provide future direction for targeted intervention to prevent suicide.⁵²

Understanding prescription drug safety and overdose risk informs prevention strategies

Drug overdose deaths have more than tripled in the US since 1990 and present particular risks to adolescents. Prescription drugs cause more than 90% of unintentional poisoning deaths; opioids are most commonly implicated. Among those treated in emergency departments for nonfatal drug poisonings, opioids and benzodiazepines are the drugs used most frequently.⁵³ Injury researchers are key in both advancing understanding of this growing public health issue and determining the most effective interventions.

- Knowledge gains through research include confirmation of the predominant role that opioid analgesics play in pharmaceutical overdose deaths, either alone or in combination with other drugs.⁵⁴



- Injury research has demonstrated the high prevalence of nonmedical prescription opiate and sedative use in the adolescent population; nearly 1 in 10 of adolescents who use the emergency department for care report such use.⁵⁵
- Given interest in delivering substance use interventions on-line, injury researchers examined the relation between online network characteristics and substance use in a national sample of young adults, ages 18–24, using data from the Virtual Networks Study. This study found that on-line networks may contribute to individual drug use among emerging adults. Findings also suggest that social networking sites may be a place to consider substance use prevention activities that can both identify and focus on at-risk subgroups.⁵⁶
- Another potential approach to opioid overdose prevention includes timely administration of naloxone, an opioid antagonist that reverses the depressant effects, but encounters numerous legal barriers that limit access to non-medical personnel. Injury researchers have compiled and detailed the legal issues surrounding bystander access to naloxone for administration to prevent fatal overdoses.⁵⁷
- Similarly, an interrupted time series analysis of opioid-related overdose death and acute care utilization rates from 2002 to 2009 demonstrated the success of overdose education and nasal naloxone distribution (OEND) implementation programs in Massachusetts by comparing community-year strata with high and low rates of OEND implementation to those with no implementation in 19 communities. This study found that opioid overdose death rates were reduced in communities where OEND was implemented.⁵⁸

Summary

Through research on injury prevention, new knowledge can be acquired and applied to improve health and save lives. These highlighted examples demonstrate the potential for the strong and lasting impact of injury science. The investment in solving the injury problem should be equivalent to the burden of injuries and at present it is not. The diverse research featured illustrates how it is possible to reduce the burden of injury if we appropriately invest resources into injury prevention research. An increased investment in injury research is warranted to further advance the science of injury prevention and treatment in the future through both the translation of research into programs and policy and the training of the next generation of injury scientists.



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