CDC Injury Center
Research Priorities

National Center for Injury Prevention and Control

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Executive Summary

Injuries and violence are among the top 10 leading causes of causes of death in the United States and among the top three for people between the ages of 1 and 44. Injuries and violence affect people of all ages and all socioeconomic groups and range from child abuse to older adult falls. While many may view injuries as inevitable or unavoidable, they are in fact predictable and preventable.

The mission of the National Center for Injury Prevention and Control (Injury Center) is to prevent violence and injuries and reduce their consequences. We accomplish our mission through surveillance, research, and the development, implementation, and evaluation of effective interventions. Although essential to any public health strategy, non-research activities such as surveillance, program implementation, translation, and evaluation are not covered in this document. For example, the Centers for Disease Control and Prevention (CDC) Injury Center collaborates with partners, such as the Core Violence and Injury Prevention Program (Core-VIPP), the Rape Prevention and Education (RPE) program, and the prescription Drug Overdose Prevention for States program, to implement public health strategies for the prevention of unintentional injury and violence. Non-research activities are reflected on CDC's Injury Center website.

Using the public health approach, the Injury Center conducts and supports research that identifies etiologic factors, develops and rigorously evaluates interventions to reduce the injury burden, and conducts research to translate science into effective programs and policies to ensure their widespread adoption. The intent of developing CDC Injury Center Research Priorities is to address strategic gaps along the public health spectrum. Identifying gaps is essential for achieving public health impact for our priority areas. For example, where evidence-based strategies exist, the Injury Center will place greater emphasis on translational research to tailor and enhance implementation of prevention efforts. In newer areas, the Injury Center may focus on identifying etiologic factors and developing intervention strategies. The new research priorities described herein highlight the Injury Center's research goals during the next 3–5 years.

These research priorities update and replace the CDC Injury Research Agenda 2009–2018 published in January 2009.* The decision to update the research agenda to include specific Injury Center research priorities before 2018 is based on the following rationale:

1. Changes in the injury and violence burden that are not reflected in the 2009–2018 research agenda* (e.g., prescription drug overdose).
2. Desire to develop more targeted research priorities that focus on CDC's public health expertise rather than address the entire field.
3. Need to create more targeted research priorities that will help grow a critical mass of research for achieving impact, but still be broad enough to allow for innovation.
4. Opportunity to better integrate the Injury Center's extramural and intramural research.
5. Interest in creating a more nimble agenda that will be updated every few years and can quickly respond to emerging issues.

*National Center for Injury Prevention and Control. CDC Injury Research Agenda, 2009-2018. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and prevention; 2009. Available at http://www.cdc.gov/injury.

Injury Center Strategic Priorities and Growth Areas

In January 2015, the Injury Center's senior leadership assessed Center priorities based on a variety of factors, including capability for impact, scalability, partner support, and existing evidence-based interventions.

Two areas continue to be CDC as well as Injury Center priorities because of their public health burden as leading causes of death in the United States and the potential for impact over the next 3–5 years. These include

- Prescription Drug Overdose
- Motor Vehicle Injury

Four additional areas were identified for increased growth and development over the next 2 years. These are Growth Areas that need greater capacity to build on current and ongoing work:

- Child Abuse and Neglect
- Falls Among Older Adults
- Sexual Violence
- Youth Sports Concussion

Research Priority Topic Areas

The topics identified for the new Injury Center Research Priorities build on previous CDC Strategic Priorities (Prescription Drug Overdose and Motor Vehicle Injuries) and Injury Center Growth Areas (Child Abuse and Neglect, Older Adult Falls, Sexual Violence, and Youth Sports Concussion). In addition, the following areas were included in the revised Injury Center Research Priorities to reflect the expertise and work within our divisions: Youth Violence, Intimate Partner Violence, and Suicide. The growth area of Youth Sports Concussion also has been broadened to include division work encompassing all Traumatic Brain Injury. The additional topics signify areas in which the Injury Center has expertise and capacity (considering human resources and fiscal constraints) and that represent a significant public health burden or significant long-term health consequences that are consistent with the Injury Center mission.

Agenda Development Process

A steering committee consisting of the Center and Division Associate and Deputy Associate Directors for Science and the Director of the Extramural Program Office developed guidance materials and was responsible for overseeing the process.

Working groups were formed for each of the topic areas consisting of Injury Center subject matter expert(s); Division Associate or Deputy Associate Director for Science; Extramural Scientific Program Officer; experts in cross-cutting topics, including those with economics, translation, or statistics expertise based on topic need; and an external member with topic expertise from the Injury Center advisory Board of Scientific Counselors (BSC).

The steering committee provided guidance documents and developed a common template to provide consistency across topic areas. Working group members were instructed to use current strategic planning documents, topic portfolio reviews, extramural reviews of previously funded projects, and the current CDC Injury Research

Agenda and other relevant resources (e.g. Institute of Medicine reports) to identify research gaps and frame research questions for a 3–5 year period.

Working group members drafted the initial plans, which were reviewed by senior leadership and the Injury Center BSC. Draft plans were discussed at the July 15, 2015, BSC meeting in Atlanta, Georgia. Federal partner input was solicited through the federal liaisons on the BSC. Further outside feedback was solicited via webinar to a broad group of Injury Center partners.

Disparities

Inherent in the Injury Center's research priorities is the identification of those at greatest risk for injury and violence and the development of strategies for reducing those disparities. Risk status can vary substantially across demographic and background factors. Age, sex, race/ethnicity, socioeconomic status, disability status, geographic location (e.g., region of the country or rural versus urban), and sexual identify are just a few of the factors that affect risk for injury or violence. For unintentional injury, disparities are noted within specific topic areas. For example, teens, older adults, and American Indians and Alaskan natives (AI/ANs) have been identified as being at greatest risk for motor vehicle-related injury; thus, research questions have been prioritized to reduce those disparities. Reducing disparities for those at risk for different forms of violence is interwoven throughout all of the violence-related priority areas. One overarching theme for Injury Center violence-related research activities will be to focus on underlying risk and protective factors as an effective means for addressing disparities for multiple forms of violence. In areas where disparities may not be directly addressed, part of the Injury Center's strategy is to identify those at greatest risk for injury and focus resources to reduce disparities.

Summary of Research Gaps and Priorities

The following is a summary of the research gaps and priorities identified through the Injury Center research priority-setting process. Specific background and research questions for each topic area are elaborated in the body of the research priorities document. This document is intended to bring the Injury Center's intramural and extramural portfolios into closer alignment. Although we do not expect to fill each of the gaps listed below in the next 3–5 years, the intent is to be able to demonstrate measurable impact or progress in each of the topic areas. The Injury Center Research Priorities will be a living document in which priorities can be changed to reflect emerging issues and changes in burden.

The research priorities are organized by unintentional injury and violence prevention topics. This framework is a practical organization, but ignores any overlap between unintentional injury and violence, as well as common factors that may increase or mitigate risk. For example, when is an overdose from prescription drugs considered unintentional versus an act of self-harm? In addition, unintentional injury and violence share many risk factors, such as alcohol use and socioeconomic status. Although not specifically addressed in these research priorities, a goal of the Injury Center is to better understand these relationships and to identify areas for research that cross-cuts unintentional injury and violence.

Unintentional Injury Prevention

Unintentional injury is a leading cause of death and disability in the United States. Risk for injury varies by age, socioeconomic, behavioral, and environmental factors, depending on the cause of injury. For example, older adults are at greater risk for death or serious injury resulting from a fall, whereas teens, older adults, and AI/ANs are at greater risk for motor vehicle crash-related injuries. Identifying special populations at greatest risk for specific injuries allows researchers and public health practitioners to develop and evaluate intervention strategies that are tailored to specific high-risk groups.

The main focus of the Injury Center is to prevent the occurrence of an injury (primary prevention). However, the center also conducts research across the injury spectrum; for example, our work on sports-related concussion has included secondary prevention, with a focus on return to play. The Injury Center also has collaborated with the National Institute on Disability, Independent Living, and Rehabilitation Research on tertiary prevention initiatives, such as identifying factors that promote or delay traumatic brain injury recovery. We collaborate with federal partners, such as the National Institutes of Health and the National Highway Traffic Safety Administration, on prescription drug overdose and motor vehicle injury research, respectively, to ensure that activities across federal agencies are complementary and not redundant. The Injury Center brings a strong public health perspective to its research, with strong emphasis on translating evidence-based strategies into practice. Where evidence-based strategies exist, such as for motor vehicle restraint use, we focus our efforts on ensuring widespread adoption and reducing existing disparities.

There are numerous causes and mechanisms for injury. As stated previously, the CDC Injury Center's research priorities for unintentional injury prevention focus on prescription drug overdose, older adult falls, motor vehicle injury, and traumatic brain injury. These priorities represent those that have the highest burden and the greatest likelihood of realizing impact toward reducing deaths and injuries and improving safety practices.

Prescription Drug Overdose

- Evaluate the impact of insurer mechanisms and pharmacy benefit manager strategies to change prescribing behavior, inappropriate use of controlled substances, and patient outcomes.
- Evaluate the impact of state policies and strategies that facilitate Prescription Drug Monitoring Program use, improve prescribing practices, educate patients, and encourage treatment and overdose response.
- Identify factors that increase risk for prescription drug-related mortality and identify risk and protective factors related to the co-use of prescription opioid pain relievers and heroin.
- Evaluate the adoption, implementation, and impact of clinical practice guidelines, clinical decision supports, and coordinated care plans within primary care practices in health systems.

Falls Among Older Adults

- Measure provider and health system implementation of clinical fall prevention activities and use existing data systems to support routine reporting and evaluation.
- Improve clinical fall prevention implementation in the primary care setting, including ensuring linkages with pharmacies and community-based prevention programs.
- Evaluate the health benefits of conducting specific clinical fall prevention strategies (like CDC's Stopping Elderly Accidents, Deaths & Injuries initiative) in healthcare settings.
- Estimate the cost of fall-related injuries and deaths and the economic efficiency of conducting clinical fall prevention strategies.
- Explain the critical factors that influence changing trends in falls and fall-related injury rates among older adults.

Motor Vehicle Injury

- Assess the effectiveness of policies and program strategies for preventing or reducing alcohol- and drug-impaired driving.
- Evaluate the effectiveness of behavioral, environmental, and policy approaches for increasing restraint use.
- Evaluate strategies for reducing disparities in motor vehicle injuries and deaths among high-risk groups and minority populations.
- Identify strategies that increase the safe transportation of older adults through research on stages of mobility transition and how to increase the use of supplemental transportation systems.
- Identify factors that influence state variations in motor vehicle injury and death rates by improving the quality, availability, and use of linked data for decision making.

Traumatic Brain Injury

- Evaluate the effectiveness of strategies for preventing all forms of traumatic brain injury (TBI) and enhance the recognition and management of mild TBI in clinical and community settings.
- Identify effective strategies for the primary prevention of sports concussion.
- Evaluate the effectiveness and economic efficiency of existing surveillance systems to capture TBI, especially mild TBI related to youth sports participation.
- Quantify short- and long-term outcomes experienced as a result of TBI and identify modifiable risk and protective factors predicting these outcomes.

Violence Prevention

Violence is a serious public health problem. From infants to the elderly, it affects people in all stages of life. People who experience violence suffer physical, mental, or emotional health problems that can have a negative impact for the rest of their lives. Violence can increase healthcare costs for everyone, decrease property values, and disrupt social services.

CDC works to reduce violence throughout the lifespan, including child abuse and neglect, youth violence, teen dating and adult intimate partner violence, sexual violence, and self-directed violence. The focus is on preventing violence before it starts. This focus complements the work of law enforcement, clinical care, and mental health and social services to hold perpetrators accountable, care for injured victims, and help victims and their families recover from violence. The goal of the CDC approach to violence prevention is to stem the flow of victims and perpetrators into the legal, medical, and social service systems; however, each of these systems is needed to fully address the causes and effects of violence.

The Injury Center emphasizes rigorous research with direct implications for preventing violence and related health impacts. In particular, the center's research focuses on primary prevention of perpetration, addressing the links across multiple forms of violence, and prevention at the community level. This research perspective complements the work of other federal agencies (e.g., Department of Education, National Institutes of Health, Department of Justice). For example, the Injury Center's emphasis on research that generates knowledge about how to prevent violence from occurring in the first place as opposed to research on efforts to apprehend, adjudicate, incarcerate, or rehabilitate violent offenders complements the work of the Department of Justice. The Injury Center's violence prevention research is designed to have practical and immediate relevance for prevention, particularly for health departments and community stakeholders.

The Injury Center Research Priorities includes a section on the need for cross-cutting research that will guide efforts to prevent multiple forms of violence, as well as sections that are specific to single forms of violence. The priorities in these sections complement each other, and readers are encouraged to look across sections to understand the range of priorities that are relevant to a topic.

Cross-Cutting Violence Prevention

- Identify modifiable factors that buffer against adversity and aggressive behavior in childhood to reduce multiple forms of violence and enhance positive health outcomes throughout the lifespan.
- Evaluate the effectiveness and economic efficiency of policies or community-level change strategies designed to enhance the economic and social environment to reduce multiple forms of violence throughout the lifespan.
- Evaluate the effectiveness and economic efficiency of early education and support for young children and their families to prevent multiple forms of violence throughout the lifespan.
- Evaluate the effectiveness and economic efficiency of programs, policies, and practices to enhance young people's skills and relationships that reduce their involvement in multiple forms of violence.
- Evaluate the effectiveness of dissemination and implementation strategies for violence prevention and assess factors that accelerate adoption of evidence-based strategies.

Child Abuse and Neglect

- Evaluate the effectiveness and economic efficiency of policies and practices that provide economic support to families to prevent child abuse and neglect (CA&N) and promote safe, stable, nurturing relationships and environments.
- Identify the community conditions that increase or reduce risk for CA&N or promote the development of safe, stable, nurturing relationships and environments.
- Evaluate the effectiveness and economic efficiency of programs or strategies that can reduce multiple forms of CA&N.

Youth Violence

- Evaluate physical environment change strategies for their effectiveness in reducing youth violence behaviors, injuries, and fatalities and their economic efficiencies.
- Identify and evaluate strategies to decrease inappropriate access to and use of weapons by minors and to prevent lethal violence.
- Evaluate the effectiveness and economic efficiency of prevention strategies that reduce the likelihood of different forms of youth violence.

Intimate Partner Violence

- Identify and measure contextual typologies for teen dating violence (TDV) and adult intimate partner violence (IPV) to guide prevention planning and improve evaluation quality.
- Examine the relationship-level (e.g., with peers, parents, romantic partners) and community-level risk and protective factors for TDV and adult IPV to identify potential opportunities for prevention strategies at these levels of the social ecology.
- Evaluate innovative or promising prevention strategies to examine their short- and long-term effects on TDV and adult IPV.

Sexual Violence

- Identify modifiable risk and protective factors for sexual violence (SV) perpetration by adolescents and young adults to better understand the ideal developmental points and focus for effective prevention.
- Evaluate the effectiveness and economic efficiency of approaches to prevent SV that target high-risk populations and shared risk factors with other health outcomes.
- Evaluate the effectiveness of SV prevention approaches that have substantial uptake in practice and are evidence-informed but lack evaluation research evidence.

Self-Directed Violence

- Evaluate the effectiveness and economic efficiency of innovative and culturally relevant programs and policies to prevent self-directed violence (SDV) in the most vulnerable populations.
- Evaluate the feasibility, scalability, and economic efficiency of means restriction strategies in the community.
- Improve methods to measure SDV and related risk factors to inform monitoring of trends, etiological research, and evaluation of prevention strategies.

Unintentional Injury Prevention

Prescription Drug Overdose

Problem Description

In the United States, the leading cause of injury death is drug overdose. Deaths involving prescription opioids outnumber deaths related to all illicit drugs. Opioid prescribing characteristics have been associated with an increased risk for death and injury among people who use opioids. While opioid pain relievers can play an important role in the management of some types of pain, the overprescribing of these powerful drugs has fueled a national epidemic of prescription drug abuse and overdose. Further, evidence to date suggests that widespread prescription opioid exposure and increasing rates of opioid addiction have played a role in the growth of heroin use.

To reverse this complex epidemic and prevent future overdose, abuse, and misuse, CDC emphasizes improving surveillance, providing support to states, and changing health system practices. CDC aims to advance "upstream" interventions that prevent people from becoming dependent on, abusing, and potentially overdosing on prescription opioid pain relievers. Improving the way opioids are prescribed can promote safer, more effective treatment while reducing opioid-related abuse, misuse, and overdose. This focus complements the work of other federal agencies that addresses enforcement and substance abuse treatment and provides for a distinct niche for CDC.

Research Gaps and Priorities

Evaluate the impact of insurer mechanisms and pharmacy benefit manager strategies to change prescribing behavior, inappropriate use of controlled substances, and patient outcomes.

Public and private insurance programs (e.g., State Medicaid, Workers' Compensation) and pharmacy benefit managers can play a key role in improving opioid prescribing. Program administrators can develop algorithms to analyze claims data and review physician prescribing and patient use patterns; such review could identify high-risk prescriptions. Insurers and benefit managers can also improve drug formularies, or preferred drug lists, to discourage unsafe and ineffective prescribing practices. It is unknown how effective these strategies are when applied to prescription opioids and in what ways they improve prescribing behaviors and patient outcomes. Research questions under this priority include

- Which insurance and pharmacy benefit manager interventions change prescribing behaviors most effectively (e.g., drug utilization review, patient review and restriction, prior authorization)?
- Which of these interventions are most cost-effective?
- What are the effective ways that state public health departments can engage insurers and pharmacy benefit managers to foster adoption of these interventions?

Research on the effectiveness of these innovative insurer and health plan programs can assist in identifying evidence-based practices that state health departments can adopt and implement.

Evaluate the impact of state policies and strategies that facilitate Prescription Drug Monitoring Program (PDMP) use, improve prescribing practices, educate patients, and encourage treatment and overdose response.

States are enacting policies and strategies focused on facilitating PDMP use (e.g., real-time, universal, proactive reporting), improving prescribing (e.g., pain clinic laws, chronic pain guidelines, healthcare licensure board policies, physician education campaigns), conducting patient education campaigns, and facilitating treatment and overdose response (e.g., Naloxone distribution laws, MAT enrollment incentives, Good Samaritan laws). There is limited evidence to show which of these policies and strategies are most effective. Questions have also been raised as to whether state policies that aim to change prescribing behavior have unintentionally led to greater heroin use and overdose among those who initially misused prescription opioids. Research questions under this priority include

- What are the impacts of innovative, untested policies and strategies at the state level on prescribing rates and prescription or illicit drug misuse, abuse, and overdose?
- What are the potential unintended consequences (e.g., encouraging transition from prescription opioid misuse to illicit drug misuse)?
- What are the impacts of harm-reduction strategies on drug overdose?
- Which PDMP strategies (e.g., mandatory registration) enhance use and produce the greatest impacts on prescribing and health outcomes?
- What are the cost implications and cost savings of identified policy changes?
- How can communications campaigns influence physician opioid prescribing and patient opioid use?

Answering these questions will provide states with the evidence needed to implement effective policy changes. Evaluation of these program and policy efforts is critical to expanding PDMPs as a public health surveillance system and to ensure safer opioid prescribing.

Identify factors that increase risk for prescription drug-related mortality, and identify risk and protective factors related to the co-use of prescription opioid pain relievers and heroin.

Understanding the risk and protective factors that drive opioid misuse, abuse, and overdose is critical for informing the development of effective prevention strategies. Epidemiological investigations have identified both individual characteristics (e.g., gender, age, income, mental health) and prescribing characteristics (e.g., high dose, extended duration) as risk factors for prescription opioid abuse and overdose. However, we have yet to learn the full constellation of factors that drive the overdose epidemic or protect patients at risk.

Research also suggests that a large proportion of people currently using heroin have a history of prescription opioid misuse, and that recent increases in heroin use and overdose might be driven by people using prescription opioids beginning to co-use heroin. It is critical to use surveillance data, such as data from prescription drug monitoring programs (PDMPs), coroners, medical examiners, and law enforcement, to identify which factors place individuals at high risk of prescription opioid misuse and

overdose and, in turn, heroin use and overdose. Research questions under this priority include

- How can PDMP, coroner, medical examiner, and law enforcement data be used to identify risk and protective factors for drug overdose?
- What are the patterns of co-use of prescription opioids and heroin, injection of opioids, and overdose?
- Does controlled substance prescribing, including opioid pain reliever prescribing, increase risk for heroin overdose?

Answering these questions can help inform the use of state surveillance systems to identify risk and protective factors and, in turn, lead to the development and identification of interventions that might reduce drug use, misuse, and overdose.

Evaluate the adoption, implementation, and impact of clinical practice guidelines, clinical decision supports, and coordinated care plans within primary care practices in health systems.

A majority of patients receive opioid analgesic prescriptions from their primary care providers. Inappropriate opioid prescribing is one of the key drivers of the prescription drug overdose epidemic. Clinical guidelines and coordinated care plans could assist health systems in improving the quality of prescribing practices. However, essential to improvement is understanding how these practices are best adopted, such as through easy-to-use clinical algorithms, training modules, electronic clinical decision support, technical packages, and outreach to professional medical societies and health systems. Research questions under this priority include

What systems-level translation and improvement strategies (e.g., opinion leader diffusion, clinical quality improvement collaboratives) can enhance adoption and effective use of recommended practices?

- What are the clinical decision support needs, barriers, and effective approaches to promoting guideline adherence in primary care?
- What factors facilitate adoption of coordinated care plans in health systems?
- What are the patient and health system impacts of guideline, clinical decision support, and coordinated care plan implementation?

This research will inform CDC, states, and health systems about how to give providers the information, tools, and support they need to make safer and more effective prescribing decisions. The goal is to reduce the most problematic prescribing behaviors and prescription drug diversion, abuse, addiction, and overdose.

Falls Among Older Adults

Problem Description

Falls are the leading cause of both fatal and nonfatal injuries among adults ages 65 or older and pose a substantial economic burden. Injuries can be moderate to severe, including hip fractures and traumatic brain injuries. In many cases a fall will result in disability, hospitalization, loss of independence, and reduced quality of life. More than 30 percent of older adults fall each year, and those who fall once are two to three times more likely to fall again.

Fall death rates have steadily increased over time. However, falls are not an inevitable part of aging. CDC's strategy is to make fall prevention (screening, assessment, treatment, and referral) a routine part of clinical care. Evidence shows the majority of modifiable risk factors can be identified and addressed in the healthcare setting, yet providers lack the tools needed to intervene.

CDC's Stopping Elderly Accidents, Deaths & Injuries (STEADI) initiative gives providers the tools and resources they need to integrate fall prevention into their daily practice. STEADI helps primary care providers identify patients at low, moderate, and high risk for a fall; identify modifiable risk factors; and offer effective interventions. Prioritized interventions include medication review, Vitamin D supplementation, and referral to community-based exercise or fall prevention programs. To facilitate patient care, follow-up, and Meaningful Use reporting, elements of STEADI can be integrated within the provider's electronic health record (EHR) system. EHR modules can prompt providers to screen for fall risk, assess risk factors, and determine necessary follow-up. Online continuing education courses are available to guide providers on how to implement STEADI. Research is needed to evaluate the implementation of STEADI and related health and economic benefits.

Research Gaps and Priorities

Measure provider and health system implementation of clinical fall prevention activities and use existing data systems to support routine reporting and evaluation.

Population-level benefits of clinical fall prevention require widespread uptake of fall prevention and management strategies in clinical settings. However, we are limited in our ability to track and measure fall prevention activities in clinical settings. More research is needed to understand who is doing fall prevention, what fall prevention activities they are doing, and what data systems are best equipped to monitor fall prevention efforts over time (e.g., electronic health record systems, quality measure reporting systems, claims data systems). Research questions under this priority include

- What clinical fall prevention strategies are being adopted?
- What proportion of older adults are screened, assessed, and managed for fall risk?
- Which data systems are available to ascertain a patient's falls screening and assessment history?
- What data system specifications are needed to generate routine reporting of falls and clinical falls screening and assessment?

This research will help CDC, federal partners, states, providers, and health systems identify who best to target for clinical fall prevention efforts and how to track clinical fall prevention efforts over time.

Improve clinical fall prevention implementation in the primary care setting, including ensuring linkages with pharmacies and community-based prevention programs.

Although multiple risk factors can be reduced or eliminated in the clinical setting, the majority of older adults are not screened for fall risk, and less than half of those who have fallen talk to their healthcare providers about their fall. Understanding how fall risk assessment, treatment, and referral—such as through clinical algorithms, workflow designs, training modules, electronic clinical decision support, technical packages, and outreach to professional medical societies and health systems—are best integrated into clinical settings is essential. Research questions under this priority include

- How do roles, behaviors, and perceptions of healthcare providers (e.g., medical doctors, pharmacists, nurses, medical assistants) affect the implementation of fall prevention practices?
- What approaches, such as clinical decision support modules, are effective in promoting fall prevention in primary care?
- What facilitates or inhibits effective fall prevention?
- What are the most effective ways to link primary care with pharmacists and community-based prevention programs to enhance coordinated care?

This research will inform CDC, federal partners, states, and health systems about how to give healthcare providers the information, tools, and support they need to integrate fall prevention strategies.

Evaluate the health benefits of conducting specific clinical fall prevention strategies (like STEADI) in healthcare settings.

Several fall prevention interventions implemented in the clinical setting have been found to be effective at reducing falls and improving health. However, the STEADI fall prevention clinical support tool that integrates multiple interventions (e.g., screening, medication management, vitamin D supplementation) has not been rigorously tested to examine its impacts on falls and fall-related injury. Essential to wide-scale implementation are data on the health-related benefits of patients seen by providers or health systems that adopt applicable interventions in everyday settings. Research questions under this priority include

- What is the effectiveness of the STEADI fall prevention clinical support tool—as a whole and of the individual components—in terms of falls and injuries prevented?
- Are there specific STEADI interventions that are more or less effective or important?
- Which specific medication classes are associated with falls, and how much does tapering or eliminating individual medication classes reduce fall risk?
- Does implementation of fall assessment in the clinical setting increase referral to and use of community-based exercise programs?

This research will inform CDC, healthcare providers, and health systems about the fidelity with which STEADI can be implemented into primary care settings and maintain its ability to reduce falls and injuries. This research also will leverage support for the adoption of STEADI or elements thereof.

Estimate the cost of fall-related injuries and deaths and the economic efficiency of conducting clinical fall prevention strategies.

Through its STEADI initiative, CDC has identified a number of effective clinical interventions that can be delivered in healthcare settings. However, essential to adoption of these strategies are data on the economic burden of falls and the economic efficiency of the STEADI initiative, including both the individual components and STEADI as a whole. Health systems are motivated to adopt evidence-based interventions when the cost benefits for implementation can be shown. Research questions under this priority include

- What are the current medical and non-medical costs of fall injuries, and how do medical costs vary by payor (e.g., Medicare)?
- What are the costs (e.g., time, effort, training, changes to EHR systems) of implementing clinical fall prevention strategies such as screening, functional assessments, medication management, and referral to specialists and community-based programs?
- Which of these interventions have the greatest economic efficiency?

This research will inform CDC, federal partners, states, providers, and health systems about the implementation costs and potential return on investment of clinical fall prevention. It will also inform policies that could encourage providers and health systems to adopt and maintain clinical fall prevention strategies over time.

Explain the critical factors that influence changing trends in falls and fall-related injury rates among older adults.

The incidence of emergency-department visits for older adult falls is increasing for both men and women, but is higher among women. The rate of falls is increasing faster than what would be expected by the aging of the U.S. population. At the same time, rates of emergency-department visits for hip fractures have been decreasing, with incidence of hip fractures differing among men and women. To best understand the complex epidemiology of older adult falls, it is important to explain changing trends in falls and fall-related injury rates. Research questions under this priority include

- What accounts for the dramatic increase in fall rates (e.g., changes in coding, chronic conditions, disability status and severity, physical activity, strength, bone mass, social and environmental circumstances)?
- What accounts for the differences in fatal and non-fatal fall rates and fall-related injuries by sex and other demographic factors (e.g., age)?
- What protective factors prevent falls, and how do these factors differ by demographic group?
- How can prevention strategies be tailored to address emerging explanatory factors?

Etiologic research is critical for understanding disparities and changing trends and can increase the impact of future prevention strategies that target the unique risks of the aging population.

Motor Vehicle Injury

Problem Description

Motor vehicle (MV) crashes are a leading cause of death in the United States for people ages 30 years or younger. Children, older adults, and racial and ethnic minorities are at particular risk in both urban and rural settings. The economic impact of MV injury is substantial, even beyond the unquantifiable pain and suffering and the value of lives lost. Achievements in reducing MV crash deaths in the past 25 years have been significant due to increased safety belt and child restraint use and declining numbers of alcohol-related crashes. But despite implementation of policies such as lower legal limits for blood-alcohol concentration, sobriety checkpoints, primary seat belt laws, graduated driver licensing, and child safety seat laws, injuries and fatalities caused by MV crashes remain a serious public health problem.

Our mission is to reduce injury and death due to MV crashes through research, surveillance, and implementation and evaluation of evidence-based programs and policies. Prevention strategies focus on improving proper restraint use, reducing drug- and alcohol-impaired driving, preventing crashes and injuries among high-risks groups, increasing safe transportation for older adults, and guiding states on the use of linked data for decision making. 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 and communities. Further research is also needed to better illuminate how older adults transition from driving to non-driving and which strategies can maintain the safety, independence, and mobility of older persons as they age.

Research Gaps and Priorities

Assess the effectiveness of policies and program strategies for preventing or reducing alcohol- and drug-impaired driving (ADID).

Alcohol- and drug-impaired driving (ADID) are major risk factors for MV crashes. Concerns have arisen because rates of alcohol-impaired driving fatalities have stabilized rather than continued to decline in recent years, while drug-impaired driving may be on the increase. States and communities have implemented an array of strategies to reduce alcohol- and drug-impaired driving, but with varying degrees of success. ADID rates must be further reduced. Research on the development, implementation, and evaluation of innovative approaches to reduce alcohol-impaired driving (AID) is necessary, as is research to explore the prevalence of impaired driving due to drug use (e.g., marijuana, opioids) and the combined effects of alcohol and drug use on crashes, injuries, and fatalities. Research questions under this priority include

- What innovative strategies can be paired to more effectively reduce recidivism for AID (e.g., paring substance use treatment with ignition interlock installation for repeat "driving under the influence" [DUI] offenders)?
- What are the core components of effective state-based ignition interlock programs, how are they implemented, and how can they be scaled up to benefit larger populations?

- Are lower blood alcohol concentration (BAC) limits for repeat offenders (currently imposed in selected states) effective in reducing AID?
- What is the effectiveness of DUI Courts in reducing AID recidivism?
- Are crash, injury, or fatality rates affected in states that have legalized marijuana use or changed policies that affect access to drugs that could impair driving?

Research on the effectiveness of innovative programs and policies to reduce ADID can assist states and communities in implementing evidence-based practices that can save lives and prevent injuries in crashes involving alcohol and drugs.

Evaluate the effectiveness of behavioral, environmental, and policy approaches for increasing restraint use.

Seat belt and child restraint use is the most effective way to save lives and reduce injuries in crashes—yet millions of adults and children still do not use restraints on every trip, or they do not use them properly. We need to better understand the barriers to correct restraint use. Restraint use varies significantly by age and race/ethnicity and between those living in urban and rural environments. Accordingly, research on barriers to restraint use among these and other vulnerable populations also is needed. Misuse rates among children in car seats and booster seats are still high, and teens are among the lowest users of seat belts. Research questions under this priority area include

- What are the barriers to properly restraining children in car seats among different demographics of parents and caregivers (e.g., by race/ethnicity, age, family composition, income)?
- Can physical anthropometry studies of size, height, and weight of children help refine recommendations for the best fit of children into child safety seats and seat belts?
- What is the role of social media and health communications technology in promoting restraint use in vulnerable populations?
- Which public health policies, safety policies, and enforcement strategies work best to increase seat belt use among high-risk drivers and passengers and reduce injuries and death?
- How can the implementation of effective interventions be improved to increase uptake and adoption (e.g., the importance of factors such as fidelity, feasibility, adaptability, sustainability, resource intensity, technical assistance and training)?

This research will inform the most effective use of behavioral and environmental strategies and policies to reduce the percentage of unrestrained drivers and passengers (including children), which, if implemented, will save lives and reduce the number of injuries resulting from vehicle crashes.

Evaluate strategies for reducing disparities in motor vehicle injuries and deaths among high-risk groups and minority populations.

Teens, older adults, and racial/ethnic minorities have some of the highest rates of motor vehicle injuries and deaths. Among all racial/ethnic groups, American Indians and Alaskan Natives (AI/ANs) have the highest rates (1.5 to 3 times the rate of other populations) of motor-vehicle–related injuries. Reducing disparities in motor vehicle injuries among high-risk groups (e.g., teens) and minority populations is a public health

priority. Surveillance, research, and program development and evaluation are all needed to reduce these preventable injuries. Some success has already been achieved in selected AI/AN populations, in teens (through graduated driver licensing), and in selected geographic locations. Research questions under this priority area include

- What implementation and dissemination strategies work best to increase seat belt use, reduce alcohol-impaired driving, and improve program delivery to minority populations and communities?
- How effective are graduated driver licensing policies when extended for use with novice drivers of any age?
- What is the potential for advanced vehicle technology (e.g., that gives feedback to drivers) to change behavior among high-risk drivers and passengers?
- How effective are dissemination efforts to reach a broad range of American Indian tribes and Alaskan Natives with best practice guidance?

Evaluation of the effectiveness of innovative approaches to reducing disparities through risk factor reduction and behavior change in minority communities will help reduce the overall burden of motor vehicle injuries and deaths in these high risk groups.

Identify strategies that increase the safe transportation of older adults through research on stages of mobility transition and how to increase the use of supplemental transportation systems.

Mobility-related injuries (including those caused by motor vehicle travel and falls) are a leading cause of death for adults ages 65 years or older. Older adults may stop (or limit) driving prematurely to avoid motor vehicle-related injuries or reduce their physical activity because of the fear of falling; as a result, their community engagement and social lives may suffer. We know that older adult mobility (i.e., the ability to remain mobile with age) is important for quality of life, access to healthcare, social connectedness, and maintaining independence. Therefore, research is needed on innovative transportation strategies to optimize older adult mobility as people age. Research questions under this priority include

- How do older adults transition from driving to non-driving, and what factors contribute to this transition?
- What effect does transitioning too early or too late have on the health and independence of older adults?
- What innovative alternative transportation systems (e.g., rideshare or ride service programs, public transport accessibility) can facilitate the transition from driving to non-driving among older adults?
- What tools and implementation practices will help maintain older adult mobility longer while maintaining the safety and independence of adults as they age?
- How do states differ with respect to policies and practices for licensing and testing of older adult drivers?

This research will improve our understanding of interventions that are likely to keep older adults healthy, active, mobile, and safe longer.

Identify factors that influence state variations in motor vehicle injury and death rates by improving the quality, availability, and use of linked data for decision making.

Data and data linkage are assets that improve the prediction and prevention of motor vehicle crashes and injuries and facilitate state comparisons of motor vehicle deaths and injuries. Linked health and transport data (e.g., emergency room and hospital data on the nature, severity, and cost of the injury; police and transport data on crash circumstances; road and weather conditions; victim disposition) are necessary to show the total impact of motor vehicle crash injury, fully assess risk factors, and support the development of interventions to reduce motor vehicle injuries and costs and improve injury response. Although some data linkage programs have been developed and implemented (e.g., Crash Outcome Data Evaluation System), too few states have them in place or use the results optimally to drive decision making. Research questions under this priority include

- What are the barriers to and facilitators of states' ability to link their transportation and health data?
- What role can new health data technologies and platforms (e.g., electronic health records) play in improving data linkage?
- Which software packages are the most efficient and accurate for states to use in linking data?
- How can the results of linked data improve transportation and health planning to reduce traffic injuries?
- How can the capacity of states be improved to access and link police, health, medical, and trauma response data?

With improved data linkage, states will be enabled to more precisely identify risk and protective factors, cost and injury burden, and potentially effective interventions and make cross-state comparisons of efforts to reduce motor vehicle injuries using linked data.

Traumatic Brain Injury

Problem Description

Traumatic Brain Injury (TBI) is a major cause of injury-related death and disability in the United States and can lead to a wide range of outcomes affecting cognitive function, behavior, emotion, motor function, and sensation. These consequences can have long-lasting effects not only for individuals, but also for their families and communities. Falls and motor vehicle crashes are the leading causes of TBI, whereas sports- and recreation-related concussions (i.e., mild TBI) have gained most prominence in the media and among medical professionals because they can have long-lasting consequences, are often overlooked, and are frequently underreported. Prevention strategies can be cross-cutting, and efforts to reduce falls, motor vehicle injuries, and abusive head trauma will also help reduce TBI. To reduce the burden and cost of TBI further, developing a better understanding of how to improve the recognition and management of mild TBI and document its health effects is vital. The goals of CDC's research in TBI are to reduce the incidence of TBI through primary prevention and to foster secondary prevention through better identification and management of TBI.

Research Gaps and Priorities

Evaluate the effectiveness of strategies for preventing all forms of traumatic brain injury (TBI) and enhance the recognition and management of mild TBI in clinical and community settings.

Public health has an important role to play not only in TBI prevention, but also in the identification, assessment, and dissemination of best practices related to the recognition, reporting, management, and treatment of mild TBI, which are keys to improving recovery. This work has implications for both the community setting (e.g., sports- and recreation-related concussions) and the clinical setting (e.g., primary care, neurosciences, emergency department practice). CDC's Heads Up initiative has been at the forefront in compiling and disseminating best practice information to increase awareness about the recognition and management of sports- and recreation-related concussions.

The Institute of Medicine identified the need for research to inform the creation of age-specific, evidence-based guidelines for concussion management. Future research can support the advancement of the evidence base and the uptake of existing mild TBI guidelines and screening tools and propel efforts to reduce the effects of mild TBI on school performance and return to play. Potential research questions include

- What barriers and facilitators influence athletes' reporting of concussions in sports, and how can the accuracy of reporting be improved?
- What are the effects of state, community, and organizational policies focused on the early recognition and management of concussion in sports (e.g., return to play, return-to-learn laws and policies)?
- How can education and awareness efforts (e.g., CDC's Heads Up initiative) best complement policy change to reduce concussion?
- How effective are pediatric guidelines for recognition and management of mild TBI in improving clinical decision making and management?

- What is the feasibility and utility of using clinical decision support tools such as electronic health records to improve diagnosis and management of TBI?
- What are the costs of various TBI prevention strategies, and which are most cost effective?

With improved prevention, recognition and management strategies, TBI and its medical, social, and educational consequences can be reduced.

Identify effective strategies for the primary prevention of sports concussion.

Preventing sports concussion is a key public health priority. Primary prevention should especially focus on groups most likely to suffer from sports-related concussion: children, adolescents, young people participating in organized sports, and those engaged in recreational activities. Multiple concussions can put athletes at even greater risk. Effective strategies—whether they be related to policies, playing rules, officiating, enforcement of safety practices, or education—are needed for improving the awareness and training of coaches, officials, parents, and athletes to prevent concussions, especially among children and young adults. Potential research questions include

- Can behavioral intervention strategies be developed and tested that change the culture of sports to promote safety and reduce concussion in youth sports and recreation?
- Which primary prevention strategies to reduce concussions are most effective with players, coaches, social groups or teams, leagues, school staff members, and families?
- What are the principal mechanisms responsible for concussion among children and adolescents?
- What is the impact of changes in rules, training practices, and the sporting environment (including officiating practices and the enforcement of rules and fair play policies) on the incidence or severity of concussions?
- Do these changes also lead to a reduction in other types of sports injuries?
- How do age and maturity affect various prevention factors? (For example, does a child's "developmental readiness" to learn make a difference?)

Focused research on strategies for the primary prevention of concussion will improve the safety of sports participation and reduce the incidence and consequences of concussion in sports and recreation.

Evaluate the effectiveness and economic efficiency of existing surveillance systems to capture TBI, especially mild TBI related to youth sports participation.

Surveillance data can provide valuable information on the incidence and causes of TBI, especially those associated with youth sports-related concussions. Surveillance is integral to guiding prevention strategies, and data from youth sports surveillance can inform the need for changes in rules, play environments (including playing surfaces), and equipment and personal protection policies, as well as for training and education for team physicians, athletic trainers, and coaches.

Ongoing systems—such as the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP), the High School RIOTM (Reporting Information Online), the

National Collegiate Athletic Association (NCAA) Injury Surveillance System, and local or statewide surveillance systems—are important sources of sports-related injury data, including data on concussions among young athletes. However, differences in methodology employed in surveillance studies may have a significant impact on the design, implementation, and effectiveness of interventions. Each concussion surveillance system is designed to collect data on a specific population. As CDC begins to explore the development of a national surveillance system to accurately determine the incidence of sports-related concussions across a variety of sporting populations, more detailed information on existing surveillance systems that collect data on concussions among elementary school-age through college-age youth will be needed. Potential research questions include

- What are the differences and similarities between surveillance systems designed to capture data on concussions in different populations?
- What are the specificity, representativeness, and cost of such sports injury surveillance systems?
- What is the reliability of self-reported concussions among different population groups and among sports participants of different ages?
- What differences are there in the prevalence, incidence, or rates of concussion in youth sports estimated from a variety of reporting strategies (e.g., reports by physicians or trainers versus surveys of players and coaches, reports of athletes versus those of parents)?
- Are there any novel approaches that are being used that can improve the reliability and quality of information reported?
- How do various sports injury surveillance systems define a sports-related injury, account for both levels of severity and lost time from participation, and include the collection of denominator data such as athlete-hours of exposure?

Additional research on the methodologies used in various surveillance systems to capture sports-related concussions will inform the development and implementation of a national surveillance system to estimate the burden of TBI, particularly mild TBI and concussion related to youth sports.

Quantify short- and long-term outcomes experienced as a result of TBI and identify modifiable risk and protective factors predicting these outcomes.

Although many people who sustain a TBI experience a good recovery, some continue to suffer from a range of health effects, from headaches and sleep problems to disabilities that can affect cognition, including attention, learning, and memory. The executive functions (e.g., attention, abstract thinking, decision making) can also be affected, as well as movement, sensation, and social-emotional functioning. TBI can negatively affect how children perform in school (including academic performance) and can delay attainment of developmental milestones. Among adults, TBI can have a detrimental effect on their ability to return to work, job retention, and independent living. In addition, TBI may contribute to chronic behavioral problems, social isolation, and mood disorders. Finally, people who sustain a TBI are at an increased risk for sustaining a subsequent TBI. The ongoing nature of many of these post-TBI concerns has been compared with the effects of a chronic disease.

More research is needed to quantify long-term negative impacts, particularly in the pediatric population, and to identify modifiable risk and protective factors that might be used to prevent these negative outcomes post-TBI. Some potential research questions include

- What is the range of long-term health, social, and occupational impacts of TBI on adults?
- What is the range of long-term health and educational outcomes for children?
- What risk and protective factors might hold promise in positively changing the trajectory of these outcomes?

Violence Prevention

Cross-Cutting Violence Prevention

Problem Description

The different forms of violence, including child abuse and neglect, youth violence, teen dating, and adult intimate partner violence, sexual violence, and self-directed violence, often share common risk and protective factors. These factors can start in early childhood and continue throughout the lifespan. They go beyond individual-level factors to include family and peer relationships and other influences from schools, the community, and society.

There are strong links between victimization and perpetration, and those who experience one form of violence are at increased risk for other forms, either as a victim or perpetrator. Despite the linkages across different forms of violence, prevention efforts are often focused on specific forms of violence in ways that limit opportunities for larger impacts. The focus on single forms of violence can also place an additional burden on communities to implement multiple prevention programs. A goal of CDC's research is to maximize the impact of violence prevention activities by taking fuller advantage of the interconnections across the different forms of violence. By focusing on activities that prevent multiple forms of violence, communities can achieve the greatest impact and increase scalability of their prevention strategies. Cross-cutting prevention efforts should start early and continue throughout the lifespan. They should be designed to use resources more effectively and to better address disparities by focusing on the populations at greatest risk.

Research is needed to guide the development of prevention strategies that can effectively protect those who are most at risk for experiencing multiple forms of violence. Research also is needed to examine how well strategies known to reduce one form of violence may also reduce other forms of violence, or how they can be enhanced to have cross-cutting effects. Another important gap that is relevant across the different forms of violence is the need to examine strategies for increasing the dissemination and implementation of evidence-based approaches.

Research Gaps and Priorities

Identify modifiable factors that buffer against adversity and aggressive behavior in childhood to reduce multiple forms of violence and enhance positive health outcomes throughout the lifespan.

Research has shown that exposure to violence, other adverse childhood experiences (ACEs), and early aggressive behavior by children often co-occur and increase later risk for violence victimization and perpetration and other negative health outcomes. However, insufficient research exists about factors that buffer against these childhood problems, build resiliency, and reduce risk for later victimization and perpetration, particularly at the outer levels of the social ecology. Important questions remain. For example,

- Which community and societal structural factors can protect children who have experienced ACEs from later experiences of multiple forms of violence?
- What are the specific mediating outcomes associated with early adversity (e.g., abuse, neglect, family dysfunction) that are most predictive of later violence, and how can those be modified?

- What individual-, family-, and community-level factors can be promoted to reduce these intermediate consequences of early adversity?

Progress on this priority will inform strategic program planning about how to build resilience among young people who are at increased risk for multiple forms of violence and other negative health outcomes.

Evaluate the effectiveness and economic efficiency of policies or community-level change strategies designed to enhance the economic and social environment to reduce multiple forms of violence throughout the lifespan.

Achieving population-level reductions in multiple forms of violence and related health disparities is constrained by the lack of strategies that are known to effectively modify community- and society-level risk and protective factors and in turn reduce violence. Increasing the availability and use of these strategies by communities could significantly enhance the prevention of violence throughout the lifespan and the promotion of health. Examples of potential research questions include

- What are the effects on violence of economic and policy strategies that increase the availability of safe, stable, and affordable housing; quality child care and education; employment opportunities; and business growth?
- Do strategies that modify alcohol prices, reduce alcohol use by minors, balance alcohol demand and density of availability, or create alcohol-free zones on college campuses lower the risk for violence?
- What traditional and social media strategies increase the accessibility of prevention approaches and modify community norms about the acceptability of violence?
- How can new communication technology be used to reduce risks for multiple forms of violence?

Knowledge about effective prevention strategies will be further strengthened when this research includes the evaluation of strategies implemented across multiple communities with diverse needs and the comparison of multiple or layered approaches (e.g., implementation of two variations of a policy or policy plus program). Rigorous evaluation of policies and other community-level strategies and the costs of these interventions, particularly in communities with high rates of violence, is needed to identify critical policy- or community-level complements to strategies that support and strengthen individual skills and family relationships. Such policies and strategies are necessary to reduce multiple forms of violence.

Evaluate the effectiveness and economic efficiency of early education and support for young children and their families in preventing multiple forms of violence throughout the lifespan.

Early prevention strategies with young children and their families have the potential to reduce risk for multiple forms of violence throughout the lifespan. In particular, strategies that provide quality care and education early in life and those that enhance training and support for families to encourage safe, stable, nurturing relationships and environments are showing substantial reductions in child abuse and neglect as well as improvements in family functioning and child behavior. Critical questions remain about the long-term

benefits and economic efficiencies of these strategies for reducing multiple forms of violence. For example,

- What are the long-term effects of early education programs on the risk for suicide, sexual violence, and dating violence in adolescence?
- Do strategies that provide support to parents in high-risk contexts reduce their risk for suicidal behavior, intimate partner violence, or other negative health outcomes?
- How can new media and communication technology be used to deliver or enhance education and support for young children and their families and reduce risk for multiple forms of violence?
- How are the short- and long-term economic efficiencies of early prevention strategies affected when multiple violence outcomes are addressed?

Prevention strategies designed to provide early education and support for young children and their families tend to focus on groups that are at high risk due to social or economic disadvantage. Research on the full scope and limits of their benefits can help improve the quality of the prevention strategies implemented, inform prevention policies to support the most beneficial programmatic activities, and ultimately reduce social inequities in violence.

Evaluate the effectiveness and economic efficiency of programs, policies, and practices to enhance young people's skills and relationships that reduce their involvement in multiple forms of violence.

Young people are at particular risk for being involved with multiple forms of violence, including sexual violence, self-directed violence, partner violence, and peer violence. Many strategies designed to prevent violence focus on enhancing young people's skills (e.g., communication, coping, problem solving) and modifying relationship factors (e.g., willingness to intervene, supervision, group norms) that are relevant to multiple forms of violence. However, evaluations have typically examined the impacts on single forms of violence. Communities' use of evidence-based approaches and efficiency in simultaneously addressing multiple forms of violence would be enhanced by increasing the availability of prevention approaches with demonstrated impacts on multiple forms of violence that young people experience, but important questions remain. For example,

- To what extent are existing strategies that have been shown to reduce one form of violence (e.g., bullying) effective at preventing other forms of violence that young people experience (e.g., dating or sexual violence)?
- Can strategies that enhance skills and relationships to prevent one specific form of violence be adapted to reduce multiple forms of violence involving youth? Are these adapted strategies more economically efficient?
- How can new media and communication technology be used to enhance young people's skills and relationships to reduce risk for multiple forms of violence?

By expanding the outcomes or years of data collection for current or prior studies and by supporting the development and evaluation of new cross-cutting strategies, communities could more efficiently and effectively reduce the multiple forms of violence involving youth.

Evaluate the effectiveness of dissemination and implementation strategies for violence prevention, and assess factors that accelerate adoption of evidence-based strategies.

Individual-, family-, and school-based approaches that effectively reduce violence are available but not widely used. Technical assistance, data-driven planning systems, and other forms of community guidance are available to bridge the gap between research and practice based on the current state of the evidence. However, research is limited about the effectiveness of these supports and how best to package prevention strategies to increase their uptake, particularly among diverse populations, communities, and settings. We need to know more about how to increase the use of evidence-based approaches for specific forms of violence, such as those that reduce child abuse and neglect or youth violence, as well as approaches that prevent multiple forms of violence. Also, we need to better understand factors that influence program effectiveness, efficiency, scalability, and sustainability over time. For example,

- What are the organizational and community capacities that are necessary for evidence-based approaches to be implemented with fidelity, and how do research-to-practice supports build these capacities?
- What are core components of evidence-based approaches (e.g., content, exercises, program delivery formats) that must be maintained, and what can be adapted when implementing evidence-based approaches with diverse populations and in diverse communities?
- How do trainings, communications campaigns, technical packages and assistance, and other dissemination approaches (e.g., Essentials for Childhood Framework) expand the implementation and scalability of evidence-based approaches?
- How can new communication technology be used to accelerate the dissemination and implementation of evidence-based strategies?
- How can data sharing and community partnership approaches that have been shown to increase the use and coordination of evidence-based programs and policies in one community be packaged or adapted for use elsewhere and still show reductions in violence?

Answers to these questions will help identify how to improve dissemination and program implementation of evidence-based approaches to optimize program value and to achieve substantial and sustained reductions across multiple forms of violence.

Child Abuse and Neglect

Problem Description

Child abuse and neglect (CA&N) affects an estimated 1 in 10 children. Associations have been documented between CA&N and several leading causes of death and disability, including heart disease, cancer, and respiratory diseases, as well as increased rates of substance use, depression, sexually transmitted diseases, and other chronic diseases and health-risk behaviors. Negative associations also have been documented between CA&N and lifetime opportunity outcomes, such as education, work performance, and income. Children who have experienced abuse and neglect are also at increased risk of experiencing other forms of violence (see cross-cutting violence prevention research priorities). CA&N includes the physical, sexual, or psychological (emotional) abuse or neglect of children under the age of 18 by a parent or caregiver. The various types of abuse are defined as follows:

- Physical abuse occurs when a parent or caregiver intentionally uses physical force against a child, and the force results in, or could result in, physical injury.
- Sexual abuse refers to any completed or attempted sexual act, sexual contact with, or exploitation (i.e., noncontact sexual interaction) of a child by a caregiver.
- Psychological (emotional) abuse occurs when the verbal and non-verbal behaviors of a parent or caregiver convey to a child that he or she is flawed, unloved, or endangered.
- Neglect is the failure to meet a child's basic needs or provide adequate supervision.

Children are frequently exposed to more than one of these four forms of abuse and neglect at the same time. To prevent CA&N and promote short- and long-term health, CDC promotes safe, stable, nurturing relationships and environments for all children. Healthy relationships and environments are fundamental to the development of the brain, endocrine, and immune systems and consequently to children's physical, emotional, social, behavioral, and intellectual capacities. A strong evidence base exists for parent training approaches in preventing CA&N; thus, CDC's research should focus on strategies that go beyond the individual- and relationship-level of the social ecology, address multiple forms of CA&N, and have potential for population-level impact.

Research Gaps and Priorities

Evaluate the effectiveness and economic efficiency of policies and practices that provide economic support to families to prevent CA&N and promote safe, stable, nurturing relationships and environments.

Poverty is a consistent risk factor for CA&N. The use of policies to support or economically strengthen families, such as cash transfers or subsidies, livable wages, and paid parental leave, may help address poverty and prevent CA&N. Cash transfers or subsidies (e.g., rental assistance, child care subsidies) provide extra income to parents to alleviate financial or housing stress. Policies on paid parental leave, such as after the birth or adoption of a child, are designed to ensure families have sufficient resources and can balance work and family roles. Paid parental leave policies may reduce CA&N by

reducing depression, stress, and the need to leave an infant in an unsafe environment. Many questions remain about the potential impacts of these approaches on CA&N. For example,

- What is the impact of these policies on rates of CA&N, and do the policies reduce the risk for all forms of CA&N?
- What is the impact of policy change on family living conditions, such as food security, housing stability, income, and child care quality, and how do these changes reduce the risk for CA&N?
- What are the effects of policies that support or economically strengthen families on those with varying levels of resources, and are there additive or synergistic effects of having multiple resources in preventing CA&N?
- What is the economic efficiency of policies and practices that support and economically strengthen families?

Answers to these questions can increase the understanding of evidence-based policies that states and local jurisdictions can adopt and implement to prevent CA&N and its associated life-long negative health consequences.

Identify the community conditions that increase or reduce risk for CA&N or promote the development of safe, stable, nurturing relationships and environments.

CA&N is the result of a number of individual-, relationship-, community-, and society-level factors, all of which interact at multiple levels of the social ecology. Unfortunately, little is known about the role of community- and society-level factors in CA&N victimization and perpetration. For example,

- What is the process by which community conditions (e.g., social and economic characteristics of neighborhoods, including access to quality education, jobs, or safe neighborhoods) relate to CA&N, and how can prevention strategies affect this relationship?
- How do community- and society-level conditions (e.g., more or less access to community resources, increase or decrease in parental incarceration) increase risk for CA&N or promote the development of safe, stable, nurturing relationships and environments?
- What are the norms that increase or decrease the likelihood of CA&N (e.g., asking for help in parenting means one is a bad parent), and what community conditions perpetuate these norms?
- What are the impacts of strategies designed to affect the public's perspective and change norms related to CA&N and safe, stable, nurturing relationships and environments?

Although risk and protective factors are not present in all contexts, identification of factors at the community- and society-level that put one at risk for or protect one from CA&N can be instrumental in understanding the causes of CA&N and ultimately contributing to more effective prevention strategies.

Evaluate the effectiveness and economic efficiency of programs or strategies that can reduce multiple forms of CA&N.

A number of effective programs and strategies have been identified for preventing CA&N. Most, however, focus on a single form of CA&N (e.g., physical abuse) even though children often experience multiple forms of CA&N. Most are also limited in their evaluation of impact and do not include effects on unintentional or undetermined injuries, although many such injuries could be the result of neglectful parenting behaviors. Additionally, prevention strategies for some forms of CA&N, such as psychological abuse and sexual abuse, are understudied. Research is needed to increase the number of programs and strategies with evidence for preventing multiple forms of CA&N. Potential research questions include

What are the short- and long-term effects on other types of CA&N from using programs or strategies that have demonstrated impact on one form of CA&N (e.g., what effect do existing evidence-based prevention strategies for physical abuse have on psychological abuse and neglect)?

- Are novel strategies effective in preventing multiple forms of CA&N?
- What is the impact of CA&N prevention programs or strategies on unintentional or undetermined injuries?
- What is the economic efficiency of programs or strategies that prevent multiple forms of CA&N?
- Are programs or strategies that have an impact on multiple forms of CA&N more cost beneficial than programs or strategies that prevent a single form of CA&N?
- How can new media and communication technology be used to reduce multiple forms of CA&N?

This research will increase the understanding of the impact of prevention efforts on multiple types of CA&N and allow for broad health impact.

Youth Violence

Problem Description

Youth violence is defined as the intentional use of physical force or power to threaten or harm others by young people ages 10–24 years. Youth violence can take different forms, such as fighting, bullying, threats with weapons, and gang-related violence. Homicide is a leading cause of death of young people. Victims, perpetrators, and witnesses of youth violence often experience a range of consequences, including physical injuries, depression, academic difficulties, and increased risk for other forms of violence. Youth violence also has substantial economic impacts on communities' healthcare costs, property values, and social services systems.

Preventing youth violence can reduce the risk for other forms of violence that young people experience (see cross-cutting violence prevention research priorities). Research on youth violence and delinquency has yielded many effective individual-, family-, and school-based approaches. CDC's research will address the gap in the availability of complementary strategies that address community risks. Research also is needed about strategies that reduce lethal violence by minors. To increase communities' ability to develop prevention plans that address their unique needs and efficiently address multiple forms of youth violence, CDC will examine approaches that support continued declines in some forms of youth violence (e.g., homicide, fighting) and jumpstart declines in other forms (e.g., gang-related violence, bullying). A solid research foundation provides communities with the potential to prevent youth violence. With a focus on key research gaps, communities will be able to use evidence-based approaches and achieve population-level and sustained reductions in youth violence.

Research Gaps and Priorities

Evaluate physical environment change strategies for their effectiveness in reducing youth violence behaviors, injuries, and fatalities and their economic efficiencies.

The physical characteristics of the environments in which individuals interact influence safety, crime, and violence. Strategies that modify the physical characteristics of housing, schools, and community areas (e.g., recreation areas, business areas, public transportation hubs) are beginning to emerge and suggest potential benefits of increasing the development and examination of these prevention strategies, but important questions remain. For example,

- Is youth violence reduced with environmental change strategies that improve visibility (e.g., "eyes on the streets"), manage accessibility (e.g., appropriate barriers such as landscaping), and provide for the repair and upkeep of neighborhoods and schools?
- How can these physical environment strategies modify social conditions in communities (e.g., perceived and actual safety, residential and business instability, social connectedness among residents, norms about the acceptability of violence) and reduce youth violence?
- What are the short- and long-term economic efficiencies experienced by the health, education, social, and justice systems from the implementation of these strategies?

Rigorous evaluation of these strategies, particularly in high-risk communities, is necessary for broad reductions in youth violence.

Identify and evaluate strategies to decrease inappropriate access to and use of weapons by minors and to prevent lethal violence.

Firearms are used in the majority of homicides of minors ages 10–17 years. Although the prevalence and correlates of inappropriate gun carrying among minors and the consequences of firearm use are well known, less is known regarding the factors associated with minors' access to, possession of, and use of firearms and other weapons to threaten or injure others and how to prevent lethal violence among young people. For instance,

- What are the sources, motivations, and deterrents of weapon-carrying behavior among minors at high risk for violence-related injuries?
- Do existing strategies that prevent violent behaviors such as physical fighting and bullying also effectively prevent weapon-related violence and lethal violence among minors?
- What innovative prevention strategies can reduce weapon carrying by minors and risk for serious injury or death?

This research will enhance the safety and health of all community residents.

Evaluate the effectiveness and economic efficiency of prevention strategies that reduce the likelihood of different forms of youth violence.

Youth violence can take many different forms, including physical fighting, threats with weapons, bullying, and gang-related violence. Communities often seek prevention strategies that will efficiently and simultaneously prevent different forms of youth violence, but few programs have been evaluated for their effectiveness in reducing multiple forms. Expanding the evaluation of prevention approaches, such as those listed in the Striving to Reduce Youth Violence Everywhere (STRYVE) Selector Tool, would increase the availability of evidence-based programs that efficiently address multiple forms of youth violence and enable diverse communities to better design approaches that address their unique needs. Examples of potential research questions include

- What is the impact of existing evidence-based family- and community-level prevention strategies on gang joining and gang-related violence?
- What impact do existing or adapted youth violence prevention programs have on multiple types of bullying, including traditional in-person bullying and cyber-bullying?
- How can new media and communication technology be used to reduce different forms of youth violence?
- What are the short- and long-term economic efficiencies of using evidence-based approaches that simultaneously reduce the risk for multiple forms of youth violence?

This research will enhance communities' ability to address their unique needs with evidence-based approaches.

Intimate Partner Violence

Problem Description

Intimate partner violence includes physical violence, sexual violence, stalking, and psychological aggression by a current or former intimate or dating partner. Intimate partner violence occurs throughout the lifespan as teen dating violence (TDV) and adult intimate partner violence (IPV). Both TDV and adult IPV are pervasive problems in the United States. At some point in their lifetime, millions of people experience partner violence perpetrated by a current or former intimate partner, and this violence can have severe and long-term health consequences. Despite the significant public health burden, much is unknown about the root causes of TDV and adult IPV and how communities can effectively prevent IPV throughout the lifespan.

Most of the programs recognized as effective for preventing partner violence take a primary prevention approach and target middle and high school students in an attempt to prevent partner violence as dating relationships begin. These programs have shown promise in preventing TDV, but it remains to be seen whether effects are long-term and whether these programs prevent adult IPV as young people, and their relationships, mature into adulthood.

Strategies that reduce other forms of violence might also have benefits for IPV (see cross-cutting violence prevention research priorities). CDC's research will improve the understanding of the etiology of TDV and adult IPV, as well as whether partner violence perpetrated in different situational contexts (e.g., conflict versus efforts to control and coerce) may have distinct etiologies, indicating separate pathways to prevention. To capitalize on all opportunities for preventing intimate partner violence, CDC's research will look beyond individual-level risk factors for violence to include relationship- and community-level factors. Additionally, by building upon existing studies of promising prevention strategies, the understanding of the mechanisms by which communities can successfully prevent TDV and adult IPV will be strengthened.

Research Gaps and Priorities

Identify and measure contextual typologies for TDV and adult IPV to guide prevention planning and improve evaluation quality.

Results from studies across the various TDV and adult IPV research domains (e.g., etiology, effectiveness) are often mixed and difficult to reconcile. Distinguishing between specific situational contexts of TDV and adult IPV perpetration (e.g., partner violence perpetrated in the context of escalation of conflict versus violence perpetrated for the purpose of controlling or coercing the partner) would allow for greater understanding of etiological pathways, better measurement to improve evaluations of current and future prevention efforts, and the development of more effective prevention efforts targeting different typologies of TDV and adult IPV. Examples of potential research questions include

- What are the disparate contextual typologies of TDV and adult IPV and how can they be conceptualized and measured?

- What different etiological pathways can be identified by measuring contextual typologies of IPV, and how can these be used to design targeted prevention strategies?

Advances in understanding the etiology of TDV and adult IPV and contextual typologies will allow for differentiation of the forms of TDV and adult IPV that are most likely to result in injury and provide for more focused and effective prevention strategies of these significant public health issues.

Examine the relationship-level (e.g., with peers, parents, romantic partners) and community-level risk and protective factors for TDV and adult IPV to identify potential opportunities for prevention strategies at these levels of the social ecology.

Some evidence suggests that peer, parental, and romantic partner influences have a substantial impact on the development of dating relationships and the characteristics of those relationships, but more research is needed to establish the nature of these influences. This research could take the form of new etiologic research or secondary analysis and further follow-up with existing etiologic studies. Also, given the interest in and proliferation of untested community-level strategies for addressing TDV and adult IPV (e.g., legislation about school prevention curricula, national and local campaigns), research about the potential for influential risk and protective factors at these outer levels is warranted. For example,

- What relationship-level (e.g., peer, parent-child, dating partner) risk and protective factors influence the development of intimate partner violence and healthy relationships as teens or adults?
- What neighborhood- or community-level risk and protective factors influence the development of TDV or adult IPV and healthy relationship behaviors?
- How do the influences of these risk and protective factors change over time and across development?

Prevention research for TDV and adult IPV is still in its early stages. Understanding risk and protective factors at levels of the social ecology beyond just the individual level will enable the identification of potential prevention strategies targeting broader influences.

Evaluate innovative or promising prevention strategies to examine their short- and long-term effects on TDV and adult IPV.

With increased political and media attention directed at TDV and adult IPV, communities are searching for and beginning to implement strategies to prevent intimate partner violence. However, most evidence-based programs in this field have been evaluated with one trial with specific adolescent samples, and their effectiveness at preventing TDV over time and preventing subsequent IPV in young adulthood is not yet empirically documented. Further, many TDV and adult IPV prevention programs and campaigns are being implemented in communities without having been rigorously evaluated. Research is needed to explore the effects of such programs on the prevention of intimate partner violence in adolescence and adulthood. Long-term effects could be

explored with further follow-up to existing prevention trials. Examples of research questions include

- Do currently established effective or promising TDV and adult IPV programs demonstrate sustained or strengthened effects over time when further follow-up is conducted?
- What are the prevention effects of other innovative or promising TDV and IPV programs that are currently being implemented but have not yet been evaluated for their impacts on intimate partner violence in adolescence and adulthood?
- Do new media and communication technology have short- or long-effects in reducing TDV or adult IPV?

Given the high demand for and current implementation of programs to prevent TDV and adult IPV, broadening the understanding of the short- and long-term effects of these programs is critical to informing communities' prevention efforts.

Sexual Violence

Problem Description

Sexual violence (SV) is a serious public health problem that affects millions of people each year. SV involves a range of acts, including attempted or completed forced or alcohol- or drug-facilitated sexual penetration (i.e., rape), being made to penetrate someone else, nonphysical pressure that results in penetration (i.e., sexual coercion), unwanted sexual contact, and unwanted noncontact sexual experiences. SV victimization is associated with adverse health consequences and risk for other forms of violence (see cross-cutting violence prevention research priorities). The burden of SV victimization is substantial for women, but men also report experiencing SV victimization. Some demographic subgroups, such as racial/ethnic minorities, adolescents, and young adults (<25 years old), continue to experience higher rates of multiple forms of SV than other groups.

Progress has been made in the area of SV prevention, but there is still much to be learned. CDC's research will expand what is known about the risk and protective factors and trajectories of behaviors related to SV and how they can inform prevention. Additionally, CDC's research will increase understanding about the connections between SV and other forms of violence (e.g., teen dating violence, youth violence) and other public health issues (e.g., teen pregnancy, human immunodeficiency virus/sexually transmitted disease [HIV/STD] risk). A broad set of prevention approaches are needed to address a variety of high-risk groups across different settings.

Research Gaps and Priorities

Identify modifiable risk and protective factors for SV perpetration by adolescents and young adults to better understand the ideal developmental points and focus for effective prevention.

Although the field has learned a lot about the etiology of SV, there are still important knowledge gaps that hinder the ability to design effective SV prevention programs. Research is needed to identify community- and society-level risk and protective factors that are associated with SV perpetration to design prevention approaches that can have a population-level impact. Also, improved understanding of the developmental trajectories of different subtypes of SV perpetration (e.g., harassment, coercion, rape) and how they relate to other types of violence would allow for the identification of critical points for intervention and the potential utility of prevention approaches that target multiple, related forms of violence versus those that are specific to SV. Potential research questions include

- Are evidence-based community-level risk factors for youth violence also predictive of SV perpetration?
- Are certain forms of SV, such as sexual harassment and sexual coercion perpetration, precursors to rape perpetration?
- At what point are SV trajectories most modifiable?
- Does SV perpetration share modifiable risk factors with other public health issues, such as HIV/STDs?

This research will advance the knowledge about factors prevention strategies should address and the best timing and content for prevention efforts.

Evaluate the effectiveness and economic efficiency of approaches to prevent SV that target high-risk populations and shared risk factors with other health outcomes.

Communities, particularly those funded by CDC's Rape Prevention and Education (RPE) program, are eager to adopt and implement comprehensive, evidence-based primary prevention initiatives that address risk and protective factors for SV and related negative health outcomes. There are currently few effective approaches that address the needs of populations with a heightened risk for SV perpetration or victimization, and important research questions remain. Research also is needed to evaluate prevention approaches designed to affect shared risk factors for SV and other health outcomes. Examples of research questions include

- To what extent are approaches focused specifically on high-risk youth (e.g., delinquent or gang-involved, involved in the child welfare system, at risk for trafficking victimization) effective at reducing risk for SV?
- Are programs that combine comprehensive sex education with efforts to develop healthy masculinity and gender norms among young people effective in reducing teen pregnancy, HIV/STDs, and SV?
- Can new media and communication technology be used to effectively prevent SV in high-risk populations and reduce other health outcomes?

By addressing these critical gaps in the prevention evidence base, including an understanding of the economic efficiencies of these strategies, communities will be able to choose from a broader set of approaches that meet the needs of their populations and can be integrated into a comprehensive and cost-effective strategy with population-level impact.

Evaluate the effectiveness of SV prevention approaches that have substantial uptake in practice and are evidence-informed but lack evaluation research evidence.

The SV field lacks sufficient evidence-based approaches to disseminate for impact on population-level violence outcomes. We need to identify and evaluate SV prevention approaches with the greatest potential for impact and adoption in practice. One gap is the lack of systematic identification and evaluation of practice-based SV prevention approaches, including those implemented by RPE grantees, to determine which are ready for rigorous evaluation.

One distinct advantage of identifying and evaluating SV prevention approaches in practice is that they are likely to be feasible to implement and acceptable to communities, but important questions remain. For example,

- Are existing practice-based SV prevention approaches effective in reducing the risk for SV?
- To what extent are social media approaches and other technologies, such as applications for mobile devices that have been developed for SV prevention, effective at reducing risk?

Research to evaluate the most promising practice-based prevention approaches will increase the evidence for SV prevention approaches that have traction within the SV field and, therefore, are known to be feasible to implement by practitioners.

Self-Directed Violence

Problem Description

Self-directed violence (SDV) encompasses a range of violent behaviors, including acts of fatal and nonfatal suicidal behavior as well as non-suicidal behavior (e.g., cutting and other self-harm without intent to die). Injury from SDV is a major public health problem throughout the United States. However, suicide—death caused by self-directed injurious behavior with an intent to die—is a leading cause of death, after age 10. Suicides reflect only a small portion of the total SDV problem. Substantially more people are hospitalized as a result of nonfatal suicide attempts. An even greater number of people are either treated in ambulatory settings or not treated at all, and millions more report suicidal ideation or thoughts of suicide. Victims of other forms of violence are often at increased risk for suicidal ideation and behavior (see cross-cutting violence prevention research priorities).

The National Action Alliance for Suicide Prevention (NAASP), the public-private partnership driving implementation of the National Strategy for Suicide Prevention, has created a research agenda and set prevention priorities for the nation. The CDC SDV prevention priorities listed in subsequent paragraphs align with this work and will expand the evidence base for prevention strategies in high-risk populations and strategies that can result in population-level reductions in SDV. To improve the identification of at-risk groups and communities where prevention strategies are critical, CDC's research will strengthen methods for measuring fatal and non-fatal SDV and associated risk factors. By addressing these research gaps, communities will be better able to achieve substantial reductions in fatal and non-fatal SDV.

Research Gaps and Priorities

Evaluate the effectiveness and economic efficiency of innovative and culturally relevant programs and policies to prevent SDV in the most vulnerable populations.

Suicide prevention strategies largely focus on youth and on raising the awareness or training of gatekeepers to identify risk. Although these strategies are part of the solution, the greater impact will arise from prevention strategies with specific focus on the largest source of suicides (e.g., middle-aged adults) and from adapting prevention strategies shown to be effective in concentrated communities at high risk (e.g., American Indian/Alaska Native youth, veterans) and evaluating them in larger, more geographically diffuse communities to reach larger numbers of the most at-risk groups. Research is needed to determine effective ways to gain access to the populations at greatest risk and to provide acceptable programs and policies. For example,

- How and where can vulnerable populations be accessed so that prevention strategies can be tested and evaluated in large enough numbers to have discernible effects?
- What types of innovative prevention strategies (e.g., creative use of social media or technology, policy changes to reduce stigma and barriers to help-seeking) are the individuals, groups, and communities at highest risk most likely to accept and benefit from?

Developing or enhancing and rigorously evaluating innovative and culturally relevant prevention strategies with vulnerable populations will help communities prevent suicides.

Evaluate the feasibility, scalability, and economic efficiency of means restriction strategies in the community.

One of the most often-cited effective strategies for preventing suicide is means restriction, such as improving the storage and security of medications and firearms. However, means restriction strategies are not fully implemented in the United States. Research to enhance existing means restriction strategies and reduce barriers to implementation would strengthen community efforts to prevent suicide among those who are most vulnerable. Potential research questions include

- Which means restriction prevention strategies are most acceptable, and which populations are most likely to accept them?
- What are the short- and long-term economic efficiencies of means restriction prevention strategies, and which strategies are scalable?
- How does the effectiveness of means restriction strategies vary across age or other demographic groups?
- To what extent does substitution of one means for another reduce the effectiveness of prevention strategies, and how can strategies be enhanced to reduce substitution?

Answers to these questions will help support the broader implementation of evidence-based means restriction prevention strategies in communities and reduce risk for suicide.

Improve methods to measure SDV and related risk factors to inform monitoring of trends, etiological research, and evaluation of prevention strategies.

Progress has been made in improving the timeliness and comprehensiveness of mortality data in recent years; however, measurement gaps related to data quality and utility remain. Suicides are often misclassified, especially when they are related to drug overdoses. To strengthen the reliability of data, mixed research methods could examine which deaths are most likely to be misclassified and under what circumstances. Examples of research questions include

- In which demographic groups, in what geographic locations or jurisdictions, and under what state death investigation systems and practices do misclassifications occur?
- Are social media data helpful in monitoring SDV or factors associated with SDV?

Research to identify and examine novel approaches to enhancing the utility of existing data (e.g., emergency department data) and emerging data sources (e.g., from online communities) can also strengthen the understanding of SDV and inform prevention strategies. For example, self-harm communities (e.g., forums, support groups) are present and observable in almost all social media networks. Research could examine the unique, network-specific data collection approaches that will increase the understanding of the epidemiology, risk and protective factors, frequency, and severity of self-injurious acts. These methods can also inform strategies for enhancing completeness of data on risk factors for suicide attempts.

The results from research under this priority will help improve measurement and monitoring of fatal SDV (e.g., National Violent Death Reporting System data) and nonfatal SDV (e.g., emergency department and self-reported data) and their risk factors and will ultimately help improve epidemiologic and prevention research.

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