Secondary Injuries Among Individuals With Disabilities
Currently 40 to 50 million people live in the United States with a variety of disabilities and this number is expected to increase substantially in the coming years. Injury and safety research has recently emerged as an important new direction in promoting the health and wellness of individuals with disabilities, and there is now increased attention on safety research and injury prevention among this vulnerable population. Individuals with disabilities are believed to face a higher injury risk than their healthy counterparts due to deficiencies in gait/motor control, impairments in mental processing, and an inability to adjust to their environment.

Although limited in number, previous studies on injuries among individuals with disabilities have indicated that individuals with disabilities are at significantly increased risk for unintentional injuries. Therefore, there is a critical need to better understand the factors that impact the occurrence of injuries among individuals with disabilities, to identify injury patterns, and to investigate the medical costs of these injuries. This research brief summarizes key findings from our previous studies, with an emphasis on children with disabilities. This document serves to highlight an important public health issue in the United States and encourage dialogue on the development of focused, coordinated strategies for safety research and injury prevention among individuals with disabilities.

Huiyun Xiang, MD, MPH, PhD
Principal Investigator
U.S. people living with disabilities

Disability ranks as a major public health problem. In 2005, the U.S. Surgeon General placed the health of adults with disabilities among the top public health issues in the United States, and Healthy People 2010 designated people with disabilities as a special target population in the nation’s strategic plan to promote health.

Recent statistics suggest that the proportion of people with disabilities in the United States is increasing among individuals from birth to 44 years of age. National data indicate that disability rates increased by 33% among girls and 40% among boys from 1990 to 1994. In 2002, an estimated 51 million adults and 9.4 million children had disabilities.

Many factors have caused these dramatic increases, including an epidemic of disability-causing chronic conditions as a result of changes in lifestyles. Additionally, biomedical advances, increased early detection of chronic diseases and improved awareness have helped more children and adults survive chronic conditions, allowing more persons with disabilities to live longer.

Disability definition

Historically, disability has been defined in a variety of ways for both program and policy purposes. The medical approach of disability has traditionally formed the basis of disability identification in education, social welfare, and rehabilitation. The central feature of the medical approach is emphasis on the individual and the focus on organ malfunction, anatomical loss, or other physical malfunctions / impairments.

More recently, a paradigm shift occurred in the concept and classification of disabilities. Unlike the medical approach, the modern biopsychosocial approach emphasizes the notion that disability is a product of the interactions of three major elements: (1) impairments of the individual (e.g., physical, cognitive, psychiatric); (2) activities (e.g., daily activities or social roles); and (3) participation within the context of the physical and social environments.

When possible, we use the biopsychosocial approach to define disability in our research. However, in several publications, we used the medical approach due to the availability of the disability information in the dataset.
Children with and without disabilities experience the same types of injury episodes, but children with disabilities experience injury episodes more often

**Purpose:** To determine whether risk of injury differs on the basis of type of disability, and whether injury episode characteristics differ by disability status in children 0-17 years of age.

**Data:** 1997-2005 National Health Interview Survey (NHIS).

**Methods:** We compared medically attended injuries in children who had and did not have a disability. Prevalence ratios and 95% confidence intervals were determined using multivariate Cox proportional hazard regression models. Injuries in the previous three months were examined among 242,796 children, 229,544 (94.5%) children without disability and 13,252 (5.5%) children with a single disability.

**Results:**

:: Children with a single disability had a significantly higher prevalence of injury than children without a disability (3.8% vs 2.5%; \( P < .01 \)).

:: Characteristics of injury episodes (type, cause, activity, and where injury episode occurred) did not differ significantly by disability status (\( P > .05 \)).

:: Only children with emotional or behavioral problems had a significantly higher risk of injury compared to children without a disability (prevalence ratio=1.50; \( P < .01 \)), when controlling for confounding sociodemographic variables.

Children with a disabling condition from a vision/hearing disability, ADD/HD, or chronic asthma have a significantly higher risk of nonfatal injury than children without a disabling condition

**Purpose:** To investigate the risk of nonfatal injury in U.S. children with disabilities.

**Data:** 2000-2002 National Health Interview Survey (NHIS).

**Methods:** We compared nonfatal injuries between children with disabling conditions and children without disabling conditions using injury rates and logistic regression models.

Injuries during the previous three months were examined among 57,909 children 5-17 years of age. Of these children, 312 had a vision/hearing disability, 711 had mental retardation, 603 had attention-deficit/hyperactivity disorder (ADD/HD), and 403 had chronic asthma. Children with other disabling conditions and children with more than one of these disabling conditions were excluded.

**Results:**

:: A higher percentage of children with disabilities reported nonfatal injuries (vision disability 4.2%, mental retardation 3.2%, attention-deficit/hyperactivity disorder 4.5%, and asthma 5.7%) than children without disabilities (2.5%).

:: With the exception of mental retardation, children with disabilities had a statistically significantly higher risk of injury than children without disabling conditions (OR=2.18, P<.01 for asthma, OR=1.68, P=.07 for vision/hearing disability, OR=1.65, P<.05 for ADD/HD), after controlling for confounding variables.

Disabled children have a significantly higher incidence of burn injuries than nondisabled children

**Purpose:** To determine the incidence of burn injuries among children with and without disabilities.

**Data:** Fiscal Year 2002 Ohio Medicaid claims database.

**Methods:** Incidences and relative risks of burn injuries for disabled and nondisabled children in Ohio were calculated by age, gender, and race/ethnicity. Burn injuries (N= 4,307) that occurred during the 2002 fiscal year were identified for children less than 12 years of age using the International Classification of Diseases, Ninth Revision, Clinical Modification codes.

**Results:**
:: The incidence of burn injuries for disabled children was significantly higher than the incidence of burn injuries for nondisabled children (103 per 10,000 vs. 77 per 10,000, respectively; p < 0.001).
:: For disabled children, the incidence of burn injuries decreased after 2 years of age and leveled out at approximately 100 per 10,000 children after 3 years of age. For nondisabled children, the incidence of burn injuries continued to decrease until 6 years of age, after which it leveled out at approximately 40 per 10,000 children.
:: After controlling for potentially confounding variables, the risk of burn injuries was significantly higher for disabled than nondisabled children (odds ratio = 1.80).

Children with disabilities are more than five times more likely to be hit by a motor vehicle as a pedestrian or bicyclist than children without disabilities

**Purpose:** To examine the association between disability and risk of vehicle-pedestrian and vehicle-bicyclist collisions among children and to compare the self-reported traffic difficulties children with and without disabilities face as pedestrians or bicyclists in the United States.

**Data:** 2002 National Transportation Availability and Use Survey for Persons with Disabilities (NTAUSPD).

**Methods:** Multivariable logistic regression was used to analyze the data. Collisions were evaluated in 687 children 5-17 years of age. Of these children, 299 (43.5%) had disabilities and 388 (56.5%) did not have disabilities.

**Results:**

:: After controlling for potential confounding variables, children with disabilities were more than five times more likely to have been hit by a motor vehicle as a pedestrian or bicyclist than children without disabilities (adjusted OR = 5.53).

:: For all children, regardless of their disability status, children who reported having some difficulty with traffic had a significantly higher risk of collisions (adjusted OR = 50.71).

:: The most commonly reported traffic difficulties for all children with and without disabilities were “Too few or missing sidewalks/paths,” “Do not know when it’s safe to cross,” and “Insensitive/unaware drivers.”

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**Weighted percentages of vehicle-pedestrian and vehicle-bicyclist collisions by child disability status**

Wheelchair related injuries may have increased in the United States during the last decade

**Purpose:** To determine the trends of wheelchair related injuries over time and describe the demographics and characteristics of wheelchair users’ injuries by age group.

**Data:** 1991-2003 National Electronic Injury Surveillance System (NEISS).

**Methods:** We generated national estimates of wheelchair related injuries treated in emergency departments for each year between 1991 and 2003 for three age groups: children 2-17 years, working age adults 18-64 years, and adults 65 years or older. Percentages and 95% confidence intervals were calculated for body region, injury diagnosis, location at time of injury, external cause of injury, and injury triggering factor.

**Results:**

:: The number of wheelchair related injuries in 2003 (>100,000) was double the number of wheelchair injuries in 1991.
:: The leading cause of injuries across all age groups of wheelchair users was tips and falls (65-80%).
:: The majority of injuries among individuals 2-5 years of age (84%) and individuals 65 years of age or older (95%) occurred in homes and institutions/hospitals.
:: Wheelchair related injuries among children 6-17 years of age showed different patterns, and most often occurred in a setting other than a home or institution/hospital (57.3%).

**National estimates of wheelchair related injuries treated in emergency departments in the U.S. from 1991-2003**

Adults with disabilities are at increased risk for injuries

**Purpose:** To determine the association between disability status and injury risk in non-institutionalized adults in the United States.

**Data:** 2004-2005 National Health Interview Survey (NHIS).

**Methods:** The association between disability and injury was examined in univariate and multivariate logistic regression analyses. Injuries in the previous three months were examined among 133,907 adults, 119,020 (89%) with no disabilities, 9,795 (7%) with moderate disabilities, and 5,092 (4%) with severe disabilities. A disability was classified as “severe” if the person needed assistance with personal care or routine needs.

**Results:**

:: The cumulative incidence of injuries was 2.3% among adults with no disabilities, 3.8% among adults with moderate disabilities, and 5.6% among adults with severe disabilities.

:: Falls were the leading mechanism of injury regardless of disability status.

:: Falls were more common in the severely or moderately disabled (68% and 47% respectively) compared to those without disabilities (28%).

:: The odds ratio for medically treated injuries was 2.98 for adults with severe disabilities and 1.68 for adults with moderate disabilities, when controlling for confounding variables.

Adults with activity limitations and participation restrictions are at increased risk for injury

**Purpose:** To investigate non-fatal unintentional injuries among Colorado adults with activity limitations and participation restrictions.

**Data:** The 1999-2000 Colorado Disability Survey.

**Methods:** The Colorado Disability Survey was conducted using the survey design and sampling methods of the Behavioral Risk Factor Surveillance System. Injuries in the previous 12 months were reported by a stratified probability sample of non-institutionalized adults.

Based on self reported activity/participation limitations, 2,602 respondents were classified into three groups (no limitations, moderate limitations, and severe limitations). A total of 19.2% of respondents reported activity/participation limitations.

**Results:**

:: Injury was reported in 24% of adults with severe activity/participation limitations, 17.8% of adults with moderate activity/participation limitations, and 12.6% of adults without activity/participation limitations.

:: The odds ratio of injury was 3.72 for adults with severe limitations and 1.87 for adults with moderate limitations, when controlling for confounding variables.

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**Prevalence (12 months) of secondary injury among adults by degree of activity limitation**

In females, disability is a mediating mechanism in the association between obesity and elevated injury risk

**Purpose:** To determine whether disabilities defined by physical functional limitations play a major role in the association between obesity and unintentional injury in adults.

**Data:** 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).

**Methods:** Respondents were categorized into groups by body mass index (BMI). Self-reported injuries in the previous twelve months were analyzed among 31,276 non-Hispanic white and African-American respondents with and without disabilities. Logistic regression models were used to examine men and women separately.

**Results:**
- The overall injury incidence was 18.6%.
- The prevalence of functional limitations increased as BMI increased (p< 0.01). One exception is that prevalence of functional limitations was also greater for the underweight (<18.5 kg/m²) category.
- In multivariate analysis, controlling for major sociodemographics, chronic medical conditions, and major injury risk behaviors, we observed a statistically significant association between obesity and injury (OR=1.27 for BMI ≥ 40; OR=1.11 for BMI=30-39.9] among females.
- The association between obesity and injury became non-significant after status of disability was considered in the logistic regression model.

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**Physical functional limitations by BMI category and gender of U.S. white and African American adults**

Conclusion

Although some progress has been made in studying injuries among individuals with disabilities, the issue of injury risk and injury prevention among individuals with disabilities has not been investigated to the degree that an issue of this importance deserves. Much remains to be learned regarding disabilities, injury risk, and effective interventions targeting individuals with disabilities. The 2008 Institute of Medicine report, *The Future of Disability in America*, concluded that funding levels for disability research have increased modestly throughout the last decade, but are still inadequate with respect to need. Because of the complex, dynamic, and diverse nature of injuries, the development of injury prevention tools for individuals with disabilities needs to involve a wide range of scientific disciplines, including clinical, health services, engineering, epidemiological, behavioral, and environmental research teams. Necessary research on injuries and disabilities cannot be pursued by a single research team or research funding agency. Investment in each of these scientific disciplines is needed to develop, test, and disseminate promising interventions that will minimize injury risk and promote safe community participation among individuals with disabilities in the United States.
The Center for Injury Research and Policy (CIRP) works globally to reduce injury-related pediatric death and disabilities. With innovative research as its core, CIRP works to continually improve the scientific understanding of the epidemiology, biomechanics, prevention, acute treatment and rehabilitation of injuries. CIRP serves as a pioneer by translating cutting edge injury research into education, advocacy and advances in clinical care. In recognition of its valuable research, the Center for Injury Research and Policy was recently designated as an Injury Control Center by the Centers for Disease Control and Prevention. CIRP is one of only thirteen such centers in the United States and is the first institution focused on pediatric injury research to receive this prestigious recognition.

Learn more about The Center for Injury Research and Policy at www.injurycenter.org.
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For additional information about our research and publications, please contact:

Huiyun Xiang, MD, MPH, PhD
Assistant Professor and Director for International Programs
Center for Injury Research and Policy
The Research Institute at Nationwide Children’s Hospital
700 Children’s Drive
Columbus, Ohio 43205

(614) 355-2768 (phone)
(614) 722-2448 (fax)
Huiyun.Xiang@NationwideChildrens.org (e-mail)