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# Motor Vehicle Crashes, Medical Outcomes, and Hospital Charges Among Children Aged 1–12 Years — Crash Outcome Data Evaluation System, 11 States, 2005–2008

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# Motor Vehicle Crashes, Medical Outcomes, and Hospital Charges Among Children Aged 1–12 Years — Crash Outcome Data Evaluation System, 11 States, 2005–2008

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## Abstract

**Problem:** Motor vehicle crashes are a leading cause of death among children. Age- and size-appropriate restraint use is an effective way to prevent motor vehicle–related injuries and deaths. However, children are not always properly restrained while riding in a motor vehicle, and some are not restrained at all, which increases their risk for injury and death in a crash.

**Reporting Period:** 2005–2008.

**Description of the System:** The Crash Outcome Data Evaluation System (CODES) is a multistate program facilitated by the National Highway Traffic Safety Administration to probabilistically link police crash reports and hospital databases for traffic safety analyses. Eleven participating states (Connecticut, Georgia, Kentucky, Maryland, Minnesota, Missouri, Nebraska, New York, Ohio, South Carolina, and Utah) submitted data to CODES during the reporting period. Descriptive analysis was used to describe drivers and child passengers involved in motor vehicle crashes and to summarize crash and medical outcomes. Odds ratios and 95% confidence intervals were used to compare a child passenger's likelihood of sustaining specific types of injuries by restraint status (optimal, suboptimal, or unrestrained) and seating location (front or back seat). Because of data constraints, optimal restraint use was defined as car seat or booster seat use for children aged 1–7 years and seat belt use for children aged 8–12 years. Suboptimal restraint use was defined as seat belt use for children aged 1–7 years. Unrestrained was defined as no use of car a seat, booster seat, or seat belt for children aged 1–12 years.

**Results:** Optimal restraint use in the back seat declined with child's age (1 year: 95.9%, 5 years: 95.4%, 7 years: 94.7%, 8 years: 77.4%, 10 years: 67.5%, 12 years: 54.7%). Child restraint use was associated with driver restraint use; 41.3% of children riding with unrestrained drivers also were unrestrained compared with 2.2% of children riding with restrained drivers. Child restraint use also was associated with impaired driving due to alcohol or drug use; 16.4% children riding with drivers suspected of alcohol or drug use were unrestrained compared with 2.9% of children riding with drivers not suspected of such use. Optimally restrained and suboptimally restrained children were less likely to sustain a traumatic brain injury than unrestrained children. The 90th percentile hospital charges for children aged 4–7 years who were in motor vehicle crashes were $1,630.00 and $1,958.00 for those optimally restrained in a back seat and front seat, respectively; $2,035.91 and $3,696.00 for those suboptimally restrained in a back seat and front seat, respectively; and $9,956.60 and $11,143.85 for those unrestrained in a back seat and front seat, respectively.

**Interpretation:** Proper car seat, booster seat, and seat belt use among children in the back seat prevents injuries and deaths, as well as averts hospital charges. However, the number, severity, and cost of injuries among children in crashes who were not optimally restrained or who were seated in a front seat indicates the need for improvements in proper use of age- and size-appropriate car seats, booster seats, and seat belts in the back seat.

**Public Health Actions:** Effective interventions for increasing proper child restraint use could be universally implemented by states and communities to prevent motor vehicle–related injuries among children and their resulting costs.

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## Introduction

Motor vehicle crashes are a leading cause of death among children in the United States (*1–3*). In 2013, 638 children aged ≤12 years died as passengers in a motor vehicle crash (of these 38% were known to be unrestrained) (*4*), and approximately 127,266 were injured (*1*). Thousands of children are not

restrained while riding in motor vehicles (*3*). Research shows that age- and size-appropriate child restraint use is the most effective method for reducing child passenger injuries and deaths in the event of a crash. Car seat use reduces the risk for death among infants (i.e., children aged <1 year) by 71% and among toddlers (aged 1–4 years) by 54% in passenger vehicles (*5*,*6*). Booster seat use reduces the risk for serious injury by 45% among children aged 4–8 years when compared with seat belt use alone (*7*). For older children and adults, seat belt use reduces the risk for death and serious injury by approximately half (*8*). On the basis of this evidence, CDC (*2*,*3*), the National Highway Traffic Safety Administration (NHTSA) (*9*), and the American Academy of Pediatrics (AAP) (*10*,*11*) recommend using age- and size-appropriate child restraints (including car seats and booster seats) until adult seat belts fit properly. Adult seat belts fit properly when the lap belt lays across the upper thighs, not the abdomen, and the shoulder belt lays across the shoulder and chest, not the neck or face (*3*). In addition, all children aged ≤12 years should be properly restrained in a back seat for optimal protection.

Because of the lack of a multistate crash database, more is known about children who die in motor vehicle crashes than about those who are injured. As directed by Congress, NHTSA created the Crash Outcome Data Evaluation System (CODES) in 1991 to estimate the effectiveness of seat belts and motorcycle helmets at reducing injuries associated with motor vehicle crashes; over time, CODES grew to study all aspects of crashes. The purpose of CODES is to gain an understanding of motor vehicle crash injuries through probabilistic linkage of crash and health care data (*12*). CODES provides a rich source of data by joining information from the transportation and health sectors. Specifically, transportation data generally lacks information on health outcomes (i.e., types and severities of injuries), and health data generally lack information on risk factors (i.e., restraint use). Together, transportation and health data provide a more complete picture of the crash, injury risk and protective factors, and resulting health outcomes and costs.

The combined transportation and health data available through CODES allowed additional exploration of the use of car seats, booster seats, and seat belts among children involved in crashes and their resulting health outcomes and medical charges. Age- and size-appropriate use of car seats, booster seats, and seat belts by children is effective at reducing injuries and deaths; however, these restraints are not always properly used. This report summarizes 2005–2008 CODES data to describe the pattern of motor vehicle crashes, medical outcomes, and hospital charges among children aged 1–12 years by type of restraint and seating position. The findings in this report can be used by states and communities, health care providers, parents and caregivers, and decision makers to improve child passenger safety through the use of effective interventions that in turn will prevent a leading cause of death among children, motor vehicle crash injuries.

# Methods

## Data Source and Database Creation

To describe characteristics of restraint use and seating position of child passengers aged 1–12 years who were involved in motor vehicle crashes and to examine how restraint use among children is associated with various crash characteristics, injuries and medical outcomes, and hospital charges, 2005–2008 CODES data were analyzed from 11 states (Connecticut, Georgia, Kentucky, Maryland, Minnesota, Missouri, Nebraska, New York, Ohio, South Carolina, and Utah). The CODES Data Network is a multistate program that was facilitated by NHTSA to probabilistically link motor vehicle crash databases (i.e., police crash reports) and hospital databases for traffic safety analyses. Probabilistic linkage uses personal and event information common to a pair of records to estimate the probability that a specific police crash report and hospital record describe the same person and event. Linking information might include names, date of birth, sex, date and time of crash and of hospital treatment, crash and hospital location, and the roles of persons and vehicle types involved. Because certain variables match between data sets and others do not, possibly because of missing or incorrect data, this method was extended in CODES to use multiple imputation of missing links and data. A more complete discussion of probabilistic linkage is described elsewhere (*13*–*15*). Individual CODES analysts were responsible for linking data from their own state police crash and hospital files. CODES analysts have extensive training with probabilistic linkage and use the same probabilistic linkage software, CODES2000 (*16*).

To combine all state data sets into a single analytical database, each state's police crash reports and hospital files were mapped onto a standardized set of data elements known as the general use model (GUM). GUM, developed through a joint effort between CODES and the NHTSA state data system, provides a standardized set of data elements routinely collected on police crash reports (*17*,*18*).

GUM contains 50 crash variables and 18 medical outcomes. The crash variables include information about the time, location, and circumstances of the crash; vehicles involved and vehicle characteristics; and injured and uninjured persons involved in the crash as reported by law enforcement. Medical outcomes (e.g., extremity fracture, treated and released, and hospitalization) were derived from emergency department and hospital discharge databases and include billing information

related to the visit, such as billed charges, length of stay, and discharge status. Missing values were imputed for all variables using sequences of regression models implemented using statistical software (*19*,*20*).

## Inclusion Criteria

GUM data from 11 CODES states (Connecticut, Georgia, Kentucky, Maryland, Minnesota, Missouri, Nebraska, New York, Ohio, South Carolina, and Utah) for the crash years 2005–2008 were included in the analysis; 2008 is the most recent year for which GUM data are available. Child passengers aged 1–12 years riding in passenger vehicles or light trucks involved in crashes occurring on public roadways were included. Abnormal distribution of age 0 years suggests some states used 0 years to represent an unknown age. Therefore, age 0 designation data were excluded. Passenger vehicles and light trucks include sedans, station wagons, pickup trucks, sport utility vehicles, and passenger vans or minivans. The final sample consisted of 417,651 crashes involving 634,238 children aged 1–12 years in passenger vehicles in the 11 CODES states during 2005–2008.

## Variables and Measures

Demographic information was collected both for the child passengers and their drivers. Driver age was classified as ≤20, 21–29, 30–39, 40–49, 50–59, and ≥60 years. Child passenger age was reported both as a continuous and categorical variable, with age groups defined as 1–3, 4–7, and 8–12 years. These age groups were selected on the basis of child passenger restraint use and seating position recommendations during 2005–2008. Race/ethnicity was not collected in most of the CODES states' crash reports; therefore, race/ethnicity data were not included in the analysis.

Information on the police crash report was collected, including driver's restraint use (restrained or unrestrained), suspicion of alcohol/drug use (suspected or not suspected), driver distraction (distracted or not distracted), whether the crash was speed related (speed related or not speed related), the time of the crash (day, 6:00 am–8:59 pm, or night, 9:00 pm–5:59 am), the location of the crash (urban [population >5,000] or rural [population ≤5,000]), and the vehicle model year (before 2002 and 2002 or later). The 2002 vehicle model year cutoff was used to account for the changes to federal regulations for car seat automobile anchors known as lower anchors and tethers for children (LATCH) (http://www.nhtsa.gov/Safety/LATCH) during 2001 and 2002. LATCH was regulated to facilitate the proper installation of car seats.

Restraint status was defined as optimal, suboptimal, or unrestrained. Because of the way in which the data were collected, optimal restraint use was defined as car seat or booster seat use for children aged 1–7 years and seat belt use for children aged 8–12 years. Suboptimal restraint use was defined as seat belt use for children aged 1–7 years. Although CDC recommends that children use a car seat until at least age 5 years and a booster seat until adult seat belts fit properly (*2*,*3*), GUM data on specific types of seats were not reliable; therefore, car seat and booster seat use were combined and classified as optimal restraint use for analyses (Box). CDC also recommends booster seat use among children aged 8–12 years until the adult seat belt fits properly (*2*,*3*). However, because GUM defined restraint use as either a seat belt or unrestrained for children aged 8–12 years, for the purposes of this report, no children aged 8–12 years could be classified as having used booster seats. Due to analytical constraints, the suboptimal case definition does not apply to children aged 8–12 years; therefore, no children in this age group could be classified as being suboptimally restrained. Children were classified as being unrestrained when no restraint use was reported (including no car seat, booster seat, or seat belt). Child seating position has three categories: front, back, and other (other compartment and vehicle exterior); however, only front and back (rows two through four) for all ages are reported.

**BOX. Child restraint use classifications**

**Ages 1–3 years**
- **Optimal:** Car seat or booster seat use*
- **Suboptimal:** Seat belt use (without booster seat)
- **Unrestrained:** No use of car seat, booster seat, or seat belt

**Ages 4–7 years**
- **Optimal:** Car seat or booster seat use
- **Suboptimal:** Seat belt use (without booster seat)
- **Unrestrained:** No use of car seat, booster seat, or seat belt

**Ages 8–12 years**
- **Optimal:** Seat belt use†
- **Suboptimal:** Not applicable
- **Unrestrained:** No use of car seat, booster seat, or seat belt

* Because of data constraints, data were categorized in broad age groups. CDC recommends rear-facing car seats for children from birth up to age 2 years (or until the child reaches the upper weight or height limit of their seat), forward-facing car seats for children aged 2 years up to at least age 5 (or until the child reaches the upper weight or height limit of their seat), and booster seats once a child outgrows their forward-facing car seat until seat belts fit properly. Adult seat belts fit properly when the lap belt lays low and snug across the upper thighs, not the abdomen, and the shoulder belt lays across the middle of the chest and shoulder, not the neck or face (available at http://www.cdc.gov/motorvehiclesafety/child_passenger_safety/cps-factsheet.html).

† Many children aged 8–12 years are not yet tall enough to obtain proper seat belt fit and would benefit from the continued use of a booster seat (*11*). Consequences for seat belt use among children who are not tall enough to use a seat belt without a booster seat include more severe injuries and additional deaths (*10*,*11*). CDC recommends booster seats use until seat belts fit properly.

Crash variables reported in this study included driver airbag deployment (deployed, not deployed, or deployment not applicable); the first harmful event (noncollision [e.g., roll-over incident], motor vehicle in transport, crash with nonfixed object, or crash with fixed object); initial impact point on the occupant's vehicle (front of vehicle, rear of vehicle, driver's side, passenger's side, other, or noncollision); and police-reported injury severity (fatal injury, incapacitating injury, nonincapacitating injury, possible injury, no injury, or injury with unknown severity). Injury severities were defined according to the Model Minimum Uniform Crash Criteria (MMUCC). A fatal injury was defined as an injury that resulted in death within 30 days after the crash. An incapacitating injury was defined as any injury, other than a fatal injury, that prevented the injured person from walking, driving, or normally continuing the activities the person was able to perform before the injury. This is often defined in practice as needing help from the scene. A nonincapacitating injury was defined as an injury (other than a fatal injury or an incapacitating injury) that was evident to observers at the scene of the crash in which the injury occurred. Examples of nonincapacitating injuries include contusions (bruises), lacerations, or a bloody nose. A possible injury was defined as a report of pain without visible injury.

Health variables reported in this analysis include the level of care (not treated at a hospital [e.g., did not link to a hospital record], emergency department visit, admitted to a hospital, or died), hospital discharge status, and total charges combined across all linked hospital records. Data on body regions injured and type of injury also were reported for child passengers. For child passengers, the most common body regions injured and types of injury were considered for analyses on the basis of specificity of injury (i.e., with "other" not being considered a specific injury) and clinical significance. The body regions included were head and neck, which includes head, face, and neck and traumatic brain injuries (TBIs); extremity; torso; vertebral column; systemwide (details available at http://www.cdc.gov/nchs/injury/ice/barell_matrix.htm); and spinal column. The types of injury included were contusion/superficial injury, open wounds, fracture, sprains and strains, and internal injuries. Hospital charges in 2008 dollars for child passengers also were collected. Median and 90th percentile hospital charges were calculated for child passengers by restraint use, seating position, and age.

## Analysis

Numbers and percentages were used to describe drivers and child passengers involved in motor vehicle crashes and to summarize crash characteristics, injured body region, nature of injury, medical outcome, and hospital charges according to child restraint use, seating position, and age. Because children can have multiple injuries, they can be represented in multiple categories for body region and type of injury. Medians and 90th percentiles were used to compare hospital charges by child restraint use, seating position, and age. Odds ratios, determined by using single variable logistic regression, and 95% confidence intervals (CIs) were used to compare a passenger's likelihood of sustaining specific types of injuries by restraint levels (optimal, suboptimal, or unrestrained) and age group. Findings were statistically significant at a p value of $<0.05$. All analyses were conducted using statistical software (*20*). The institutional review boards of the University of Utah and CDC approved this study.

# Results

## Characteristics of Children

During 2005–2008, a total of 634,238 children aged 1–12 years were involved in a motor vehicle crash in 11 CODES states. Of these children, 50.4% were boys and 49.7% were girls. The proportion of children in the data set decreased with increasing age, from 10.6% for children aged 1 year to 7.7% for children aged 12 years.

## Car Seat and Booster Seat Use and Seating Position

Among children aged 1–3 years, 79.9% were using a car seat or booster seat, 17.8% were using a seat belt, and 2.3% were unrestrained at the time of the crash. Among children aged 4–7 years, 35.9% were using a car seat or booster seat, 61.0% were using a seat belt, and 3.1% were unrestrained at the time of the crash. Among children aged 8–12 years, 96.4% were restrained and 3.6% were unrestrained.

The majority of children were sitting in a back seat at the time of the crash; however, this proportion decreased as the child's age increased. For instance, 93.0% of children aged 1–3 years, 86.3% of children aged 4–7, and 67.2% of children aged 8–12 years were sitting in a back seat at the time of the crash (Table 1).

A higher percentage of children who were optimally restrained also were sitting in a back seat (Table 2). A significant decrease occurred among children who were optimally restrained and sitting in the back seat from age 7 years (94.7%) to age 8 years (77.4%); only 54.7% of restrained children aged 12 years were sitting in a back seat. Among the children who were unrestrained, 25.0%–32.3% of children aged 8–12 years were in the front seat, with the percentage varying by age.

## Characteristics of Drivers

A higher percentage of female drivers (72.7%) had optimally restrained children than male drivers (69.5%). Male drivers also were more likely to have unrestrained child passengers (3.9%) than female drivers (2.6%). Drivers aged ≤20 years had the highest percentage of unrestrained child passengers (5.8%), followed by drivers aged 50–59 years (3.8%) and aged ≥60 years (3.5%). The youngest and oldest drivers also had the highest percentage of children riding in a front seat (Table 3).

Drivers with risky driving behaviors (as reported on the crash report), including those who were driving unrestrained, driving with suspected alcohol or drug use, driving while distracted, or in a speed-related crash, had a higher percentage of unrestrained child passengers. Among the children riding with unrestrained drivers, 41.3% of children also were unrestrained, compared with 2.2% among the restrained drivers. In addition, 29.2% of the children riding with unrestrained drivers were in the front seat, compared with 18.8% of children riding with restrained drivers. Drivers suspected of alcohol or drug use that was a contributing factor to the crash had a higher percentage of unrestrained child passengers (16.4%) and child passengers riding in a front seat (32.1%) compared with drivers not suspected of alcohol or drug use (2.9% unrestrained; 19.1% front seat). Drivers who were distracted or in a speed-related crash also had a lower percentage of optimally restrained children, a higher percentage of unrestrained children, and a higher percentage of children riding in the front seat compared with drivers who were not distracted and did not have a speed-related crash (Table 3).

A higher percentage (71.9%) of children were optimally restrained during daytime crashes (6:00 a.m.–8:59 p.m.) than during night-time crashes (67.5%; 9:00 p.m.–5:59 a.m.) (Tables 3–10). In addition, a higher percentage of children were unrestrained during night-time crashes (5.5%) compared with daytime crashes (2.9%). Crashes that occurred in urban locations had a slightly lower percentage of optimally restrained children (71.8%) but a lower percentage of unrestrained children (2.9%) and a lower percentage of children riding in a front seat (17.5%) than crashes that occurred in rural locations (73.0%, 4.2%, and 19.2%, respectively). A higher percentage of children riding in newer vehicles (2002 or later) when they crashed were optimally restrained (75.9%), and a lower percentage were unrestrained (1.9%) compared with children riding in older vehicles (70.5% and 3.8%, respectively).

## Body Region Injured

Head, face, or neck injuries were the most prevalent body region injured among children aged 1–3 years and 4–7 years, followed by extremity injuries. Extremity injuries were the most prevalent among children aged 8–12 years, followed by head, face, or neck injuries. Regardless of age group, unrestrained children had the highest percentage of injuries for each body region. Children optimally and suboptimally restrained had minor differences in body region injured, by age group (Table 11) (Table 12).

Unrestrained children had approximately 7 times the percentage of TBIs compared with either optimally or suboptimally restrained children. For example, 0.2% of children aged 4–7 years who were optimally restrained and 0.3% of children who were suboptimally restrained experienced a TBI, compared with 2.2% of unrestrained children of the same age (Table 11). In all but one instance, children sitting in a back seat had an equal or lower percentage of injuries by body region compared with children sitting in a front seat (Table 11).

## Type of Injury

Contusions and other superficial injuries were the most prevalent type of injury regardless of age (Table 13) (Table 14). The second most common type of injury among children aged 1–3 years and 4–7 years was open wounds and among children aged 8–12 years was sprains and strains (Table 13). Suboptimally restrained children aged 4–7 years reported higher percentages for each nature of injury as compared with their optimally restrained counterparts. For example, 4.5% of suboptimally restrained children had a contusion or other superficial injury compared with 3.7% of optimally restrained children (Table 13). Regardless of age, unrestrained children had the highest percentage of each type of injury (Table 13) (Table 14).

## Odds of Injury

Children aged 1–3 years who were optimally restrained (i.e., in a car seat or booster seat) were less likely to have neck, back, or abdominal injuries (odd ratio [OR] = 0.37; 95% CI = 0.32–0.41); to have a TBI (OR = 0.13; 95% CI = 0.10–0.17); or to be hospitalized (OR = 0.41; 95% CI = 0.38–0.45) than children aged 1–3 years who were unrestrained (Table 15) (Table 16). Children aged 1–3 years who were riding in a back seat were less likely to have neck, back, or abdominal injuries (OR = 0.83; 95% CI = 0.75, 0.92) or a TBI (OR = 0.65; 95% CI = 0.48–0.88) than children aged 1–3 years riding in a front seat.

For children aged 4–7 years, being optimally restrained (car seat or booster seat) reduced the odds of neck, back, or abdominal injuries when compared with being suboptimally restrained (seat belt) (OR = 0.81; 95% CI = 0.77–0.84); the odds were reduced even further when compared with being

unrestrained (OR = 0.28; 95% CI = 0.25–0.3) (Table 15) (Table 16). Children aged 4–7 years who were suboptimally restrained with a seat belt also had a lower odds of neck, back, or abdominal injuries than children who were unrestrained (OR = 0.35; 95% CI 0.32–0.38).

These trends were similar for TBIs among children aged 4–7 years. Specifically, children aged 4–7 years who were optimally restrained had significantly lower odds of a TBI than children who were suboptimally restrained (OR = 0.79; 95% CI = 0.66–0.95) or unrestrained (OR = 0.10; 95% CI = 0.08–0.12, respectively) (Table 15) (Table 16). Children aged 4–7 years who were optimally restrained also had the lowest odds of being hospitalized, followed by those who were suboptimally restrained. In addition, sitting in a back seat compared with the front decreased the odds for neck, back, or abdominal injuries; TBIs; and hospitalization among children aged 4–7 years.

Children aged 8–12 years who were restrained had much lower odds of having neck, back, or abdominal injuries; having TBIs; and being hospitalized than their unrestrained counterparts. Sitting in a back seat was also protective among children aged 8–12 years when compared with sitting in the front seat. Children aged 8–12 years who were restrained in the back seat versus restrained in the front seat were less likely to have neck, back, or abdominal injuries (OR = 0.84; 95% CI = 0.81–0.87); to have a TBI (OR = 0.83; 95% CI = 0.71–0.97); or to be hospitalized (OR = 0.90; 95% CI = 0.87–0.92) (Table 15) (Table 16).

## Hospital Charges

Among all age groups, the median (Table 17) (Table 18) and 90th percentile (Table 19) (Table 20) hospital charges in 2008 dollars for all charges incurred during motor vehicle crashes increased from optimal to suboptimal to unrestrained and from back to front seating position. For example, the median hospital charges for children aged 4–7 years were $369.18 for those optimally restrained, $422.15 for those suboptimally restrained, and $619.00 for those unrestrained; the charges were $404.94 for those in a back seat and $472.32 for those in a front seat. The 90th percentile hospital charges for children aged 4–7 years who were in motor vehicle crashes were $1,630.00 and $1,958.00 for those optimally restrained in a back seat and front seat, respectively; $2,035.91and $3,696.00 for those suboptimally restrained in a back seat and front seat, respectively; and $9,956.60 and $11,143.85 for those unrestrained in a back seat and front seat, respectively.

# Discussion

This multistate, multiyear analysis provides linked data that highlight differences in the frequencies and odds of various injuries, medical outcomes, and charges among children by age, restraint type, and seating position. The number and percentage of children involved in a crash who were suboptimally restrained (approximately 160,800 children aged 1–7 years), unrestrained (approximately 20,000 children aged 1–12 years), or seated in a front seat instead of a back seat (approximately 119,000 children aged 1–12 years) indicate that many child passengers are at risk and that their safety can be substantially improved.

Parents and caregivers are the first line of defense for children in a crash; therefore, strategies for improving child passenger safety should focus on helping parents and caregivers learn how to properly buckle their children in age- and size-appropriate car seats, booster seats, and seat belts in the back seat on every trip. Findings from this study further confirmed that parents often prematurely transition children to the next, less protective, stage of child passenger restraint and that overall restraint use decreases as age increases. With every transition to the next stage of restraint (e.g., rear-facing seat to forward-facing seat, forward-facing seat to booster seat, and from booster seat to seat belt), children are less protected in a crash. For instance, this study examined the difference between seat belt use and car seat or booster seat use among children aged 4–7 years, children who, based on growth charts, should all be restrained in car seats or booster seats. The use of a car seat or booster seat among children aged 4–7 years reduced the risk for neck, back, or abdominal injuries; traumatic brain injuries; and hospitalization compared with seat belt use alone. This demonstrates that keeping children in age- and size-appropriate car seats and booster seats improves child passenger safety and supports current child passenger safety recommendations.

Several effective strategies can be used to help parents and caregivers improve child passenger safety. They include child passenger restraint laws that require car seat or booster seat use for children through age 8 years, car seat and booster seat giveaways and seat loaner programs that include education for parents or caregivers, and increasing the number of certified Child Passenger Safety Technicians (*2*,*3*). These certified technicians provide free, one-on-one, personalized instruction on how to properly install and use car seats and booster seats (information available at http://cert.safekids.org). Child passenger restraint laws that reflect the best available science can help protect the greatest number of children and increase car

seat and booster seat use, which in turn reduce motor vehicle injuries and deaths. For example, a study of five states that increased the age requirement to age 7 or 8 years for car seat and booster seat use found that the rate of children using car seats and booster seats increased nearly three times and the rate of children who died or had incapacitating injuries decreased by 17% (*21*). In addition, the Community Preventive Services Task Force (*The Guide to Community Preventive Services,* or *The Community Guide*) also recommends car seat and booster seat laws, as well as distribution plus education programs for car seat and booster seats based on strong evidence of their effectiveness for increasing restraint use and decreasing injuries and deaths among child passengers (*22*). Distribution plus education programs also are recommended in a more recent review for increasing restraint use (*23*).

Decreasing risky driving behaviors, such as seat belt nonuse and alcohol-impaired driving, also might help protect child passengers. In this study, drivers who engaged in risky driving behaviors, including driving unrestrained, driving with suspected alcohol or drug use, and involvement in speed–or distracted-related crashes, all had higher percentages of unrestrained child passengers and child passengers in the front seat at the time of the crash. Enforcement and implementation of effective interventions intended for adults to increase restraint use and prevent impaired driving, distracted driving, and speeding can reduce the risk of motor vehicle crashes (*24*, *25*) and in turn also might reduce the risk for injury to child passengers. An estimated one in five child passenger deaths involve an alcohol-impaired driver (*8*), and typically the child's driver is the person who is impaired (*8*,*26*). Effective strategies for decreasing alcohol-impaired driving include sobriety checkpoints, requiring ignition interlocks for all convicted alcohol-impaired driving offenders, 0.08% blood alcohol concentration (BAC) laws, maintaining current minimum legal driving age laws, and zero tolerance BAC laws (*24*).

## Limitations

The findings in this report are subject to at least two limitations. First, distinguishing whether children were riding buckled in a car seat or a booster seat was not possible. In addition, determining whether children aged 8–12 years were buckled in a booster seat was not possible because GUM defined restraint use as either a seat belt or unrestrained for children aged 8–12 years. Many children aged 8–12 years are not yet tall enough for a seat belt to fit properly and therefore would benefit from the continued use of a booster seat (*11*). Consequences for seat belt use among children who are not tall enough to use a seat belt without a booster seat include more severe injuries and additional deaths (*10*,*11*); therefore, prevalence of booster seat use among children in crashes and the difference in medical outcomes and charges is an important issue that could not be assessed in this study. Observational 2013 data on restraint use among children aged ≤12 years show that 32% of children who were 37–53 inches tall and 73% of children who were 54–56 inches tall were prematurely graduated to seat belt use without a booster seat (*27*). This demonstrates the potential for injury prevention through continued booster seat use until adult seat belts fit properly. Second, certain data were missing. Frequently, analyses using databases with missing data simply exclude cases that are missing one or more analytical variables. Although the rate for individual missing values of variables might be small, the cumulative effect of missing data can result in a large number of records being excluded from an analysis of multiple variables. For this reason, missing data were imputed both in the crash and hospital databases. A separate imputation model was built for each state's data using chained regression models as implemented in the statistical software used. The predistribution and postdistribution of analytical variables were compared to verify consistency. The uncertainty added by multiple imputation can lead to inflated standard errors. However, the resulting increase in sample size by including all observations in the analysis often offsets this increase and results in lower measures of variability.

## Conclusion

Linked crash and medical data were used to provide a more complete picture of motor vehicle crashes and their medical costs and outcomes. A 2014 CDC study showed that for every motor vehicle passenger killed in a crash in 2012, eight were hospitalized, and 100 were treated and released from the emergency department (*28*). Nonfatal crash injuries occur frequently, resulting in substantial costs to individuals, families, employers, and society (*28*). The Moving Ahead for Progress in the 21st Century Act recognizes the goal of reducing injuries and deaths and requires states to monitor and report on serious crash injuries, in addition to deaths (*29*). Comprehensive data, which can be achieved through data linkage, will improve the ability of government, employers, and health and traffic safety organizations to understand and prevent motor vehicle crash

injuries including among child passengers. CDC and NHTSA have evaluated 25 state data linkage programs and provide information that states can use to start or improve their data linkage efforts (*30*).

Continued linkage between police report data on motor vehicle crashes and the associated medical data is needed to allow states, communities, and researchers to better understand motor vehicle crashes, as well as their risk and protective factors and resulting medical outcomes and costs. These data provide additional information about motor vehicle–related injuries that do not result in death but still have a significant impact on public health and medical and societal costs.

This study uses linked data and reinforces the knowledge that proper car seat, booster seat, and seat belt use among children prevents injuries, including head, neck, and abdominal injuries and TBIs, decreases deaths, and reduces hospital charges. However, the number, severity, and cost of injuries among children in crashes who were not optimally restrained or who were not seated in a back seat indicates the need for improvement in proper use of age- and size-appropriate car seats, booster seats, and seat belts in the back seat.

Although strategies to prevent injuries and deaths among child passengers in motor vehicle crashes are well established, they are not universally implemented (*2*,*3*). Through the implementation of effective interventions (*2*,*3*,*24*,*25*) health care providers, parents and caregivers, and states and communities can do more to help keep child passengers safe and prevent a leading cause of death among children.

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## References

1. CDC. WISQARS (Web-based Injury Statistics Query and Reporting System). Atlanta, GA: US Department of Health and Human Services, CDC; 2013. Available at http://www.cdc.gov/injury/wisqars.
2. CDC. Vital signs: restraint use and motor vehicle occupant death rates among children aged 0–12 years—United States, 2002–2011. MMWR Morb Mortal Wkly Rep 2014;63:113–8.
3. CDC. Vital signs fact sheet. Child passenger safety: buckle up every age, every trip. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/vitalsigns/pdf/2014-02-vitalsigns.pdf.
4. National Highway Traffic Safety Administration. Traffic safety facts, 2013 data: occupant protection. Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration; 2015. Available at http://www-nrd.nhtsa.dot.gov/Pubs/812153.pdf.
5. Kahane CJ. An evaluation of child passenger safety: the effectiveness and benefits of safety seats. Washington, DC: National Highway Traffic Safety Administration; 1986. Available at http://www-nrd.nhtsa.dot.gov/pubs/806890.pdf.
6. National Highway Traffic Safety Administration. Revised estimates of child restraint effectiveness. Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration; 1996. Available at http://www-nrd.nhtsa.dot.gov/pubs/96855.pdf.
7. Arbogast KB, Jermakian JS, Kallan MJ, Durbin DR. Effectiveness of belt positioning booster seats: an updated assessment. Pediatrics 2009;124:1281–6.
8. National Highway Traffic Safety Administration. Traffic safety facts, 2013 data: children. Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration; 2015. Available at http://www-nrd.nhtsa.dot.gov/Pubs/812154.pdf.
9. National Highway Traffic Safety Administration. Parents Central. Washington DC: US department of Transportation, National Highway Traffic Safety Administration; 2015. Available at http://www.safercar.gov/parents/index.htm.
10. Durbin DR; Committee on Injury, Violence, and Poison Prevention. Child passenger safety. Pediatrics 2011;127:788–93.
11. Durbin DR; Committee on Injury, Violence, and Poison Prevention. Child passenger safety. Pediatrics 2011;127:e1050–66.PubMed.
12. National Highway Traffic Safety Administration. The Crash Outcome Data Evaluation System (CODES) and applications to improve traffic safety decision-making. Washington DC: US department of Transportation, National Highway Traffic Safety Administration; 2011. Available at http://www-nrd.nhtsa.dot.gov/Pubs/811181.pdf.
13. Cook LJ, Olson LM, Dean JM. Probabilistic record linkage: relationships between file sizes, identifiers and match weights. Methods Inf Med 2001;40:196–203.
14. Jaro MA. Probabilistic linkage of large public health data files. Stat Med 1995;14:491–8.
15. McGlincy MH. A Bayesian record linkage methodology for multiple imputation of missing links. In: Proceedings of the American Statistical Association. pp. 4001–8. In: Proceedings of the 2004 American Statistical Association Conference, Survey Research Methods Section; August 8–12, 2004; Toronto, Ontario, Canada; 2004. Available at http://www.amstat.org/sections/srms/Proceedings/y2004/files/Jsm2004-000683.pdf.
16. Strategic Matching. LinkSolv, ed 8.1.9077 [Software and documentation]. Morrisonville, NY: Strategic Matching; 2000.
17. National Highway Traffic Safety Administration, Federal Highway Administration, Federal Motor Carrier Safety Administration, Governors Highway Safety Association. MMUCC guideline. Model minimum uniform crash criteria. 4th ed. Washington, DC: National Highway Traffic Safety Administration; 2012. Available at http://www.mmucc.us/sites/default/files/MMUCC_4th_Ed_0.pdf.
18. National Highway Traffic Safety Administration. National Automotive Sampling System (NASS) General Estimates System (GES) analytical user's manual 1988–2012. Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis; 2014.
19. Raghunathan TE, Lepkowski JM, Van Hoewyk JV, Solenberger P. A multivariate technique for multiply imputing missing values using a sequence of regression models. Surv Methodol 2001;27:85–95.
20. SAS Institute. SAS software, ed 9.2. Cary, NC: SAS Institute; 2002.
21. Eichelberger AH, Chouinard AO, Jermakian JS. Effects of booster seat laws on injury risk among children in crashes. Traffic Inj Prev 2012;13:631–9.

22. Zaza S, Sleet DA, Thompson RS, Sosin DM, Bolen JC; Task Force on Community Preventive Services. Reviews of evidence regarding interventions to increase use of child safety seats. Am J Prev Med 2001;21(Suppl):31–47.
23. Ehiri JE, Ejere HOD, Magnussen L, Emusu D, King W, Osberg JS. Interventions for promoting booster seat use in four to eight year olds traveling in motor vehicles. Cochrane Database Syst Rev 2006;1:CD004334.
24. The Guide to Community Preventive Services. Motor vehicle-related injury prevention; Atlanta, GA: CDC: 2015. Available at http://www.thecommunityguide.org/mvoi/index.html.
25. National Highway Traffic Safety Administration. Countermeasures that work: a highway safety countermeasures guide for State Highway Safety Offices, 7th ed. Washington, DC: National Highway Traffic Safety Administration; 2013. Available at: www.nhtsa.gov/staticfiles/nti/pdf/811727.pdf.
26. Quinlan K, Shults RA, Rudd RA. Child passenger deaths involving alcohol-impaired drivers. Pediatrics 2014;133:966–72.
27. Pickrell TM, Choi E-H. The 2013 national survey of the use of booster seats. Report no. DOT HS 812 037. Washington, DC: National Highway Traffic Safety Administration; 2014. Available at http://www-nrd.nhtsa.dot.gov/Pubs/812037.pdf.
28. Bergen G, Peterson C, Ederer D, et al. Vital signs: health burden and medical costs of nonfatal injuries to motor vehicle occupants—United States, 2012. MMWR Morbid Mortal Wkly Rep 2014;63:894–900.
29. Moving Ahead for Progress in the 21st Century Act. Pub. L. No. 112-41, 126 Stat. 405 (July 6, 2012). Available at http://www.gpo.gov/fdsys/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf.
30. Milani J, Kindelberger J, Bergen G, et al. Assessment of characteristics of state data linkage systems. Washington, DC: National Highway Traffic Safety Administration; Atlanta, GA: CDC; 2015. Available at http://www.cdc.gov/motorvehiclesafety/linkage.

**TABLE 1. Frequency and percentage of restraint use and seating position among children aged 1–12 years, by age — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Age (yrs) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| 1 | 57,132 | (84.7) | 8,993 | (13.3) | 1,315 | (2.0) | 4,430 | (6.6) | 62,748 | (93.4) |
| 2 | 47,231 | (80.8) | 9,901 | (16.9) | 1,333 | (2.3) | 3,927 | (6.8) | 54,135 | (93.2) |
| 3 | 41,368 | (73.2) | 13,603 | (24.1) | 1,556 | (2.8) | 4,376 | (7.8) | 51,564 | (92.2) |
| 4 | 33,864 | (59.9) | 21,108 | (37.3) | 1,602 | (2.8) | 5,359 | (9.6) | 50,475 | (90.4) |
| 5 | 22,392 | (42.0) | 29,197 | (54.8) | 1,699 | (3.2) | 6,332 | (12.1) | 46,191 | (87.9) |
| 6 | 12,710 | (25.0) | 36,443 | (71.8) | 1,630 | (3.2) | 7,713 | (15.5) | 42,207 | (84.6) |
| 7 | 6,670 | (13.4) | 41,559 | (83.4) | 1,587 | (3.2) | 9,075 | (18.5) | 39,887 | (81.5) |
| 8 | 47,389 | (96.8) | NA | NA | 1,588 | (3.2) | 10,933 | (22.7) | 37,260 | (77.3) |
| 9 | 46,310 | (96.5) | NA | NA | 1,679 | (3.5) | 12,598 | (26.7) | 34,675 | (73.4) |
| 10 | 46,509 | (96.4) | NA | NA | 1,760 | (3.7) | 15,379 | (32.3) | 32,263 | (67.7) |
| 11 | 45,614 | (96.3) | NA | NA | 1,742 | (3.7) | 17,637 | (37.7) | 29,149 | (62.3) |
| 12 | 46,722 | (95.8) | NA | NA | 2,032 | (4.2) | 21,563 | (44.8) | 26,619 | (55.3) |

**Abbreviation:** NA = not applicable.

**TABLE 2. Frequency and percentage of restraint use and seating position among children aged 1–12 years, by age — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front (N = 85,430) | | Back (N = 365,736) | | Front (N = 29,387) | | Back (N = 127,309) | | Front (N = 4,505) | | Back (N = 14,128) | |
| Age (yrs) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| 1 | 2,323 | (4.1) | 54,809 | (95.9) | 1,844 | (21.1) | 6,914 | (78.9) | 264 | (20.5) | 1,025 | (79.5) |
| 2 | 1,964 | (4.2) | 45,267 | (95.8) | 1,721 | (18.1) | 7,809 | (81.9) | 241 | (18.5) | 1,059 | (81.5) |
| 3 | 1,798 | (4.4) | 39,571 | (95.7) | 2,294 | (17.6) | 10,778 | (82.5) | 285 | (19.0) | 1,215 | (81.0) |
| 4 | 1,562 | (4.6) | 32,302 | (95.4) | 3,489 | (17.1) | 16,939 | (82.9) | 308 | (20.0) | 1,235 | (80.0) |
| 5 | 1,042 | (4.7) | 21,349 | (95.4) | 4,934 | (17.3) | 23,555 | (82.7) | 355 | (21.6) | 1,286 | (78.4) |
| 6 | 642 | (5.1) | 12,068 | (95.0) | 6,721 | (18.9) | 28,916 | (81.1) | 351 | (22.3) | 1,223 | (77.7) |
| 7 | 352 | (5.3) | 6,318 | (94.7) | 8,384 | (20.6) | 32,398 | (79.4) | 340 | (22.5) | 1,171 | (77.5) |
| 8 | 10,558 | (22.6) | 36,132 | (77.4) | NA | NA | NA | NA | 375 | (25.0) | 1,128 | (75.1) |
| 9 | 12,196 | (26.7) | 33,489 | (73.3) | NA | NA | NA | NA | 402 | (25.3) | 1,186 | (74.7) |
| 10 | 14,927 | (32.5) | 31,055 | (67.5) | NA | NA | NA | NA | 452 | (27.2) | 1,208 | (72.8) |
| 11 | 17,108 | (37.9) | 28,041 | (62.1) | NA | NA | NA | NA | 528 | (32.3) | 1,108 | (67.7) |
| 12 | 20,958 | (45.3) | 25,335 | (54.7) | NA | NA | NA | NA | 604 | (32.0) | 1,284 | (68.0) |

**Abbreviation:** NA = not applicable.

**TABLE 3. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **452,640** | **(71.6)** | **160,273** | **(25.4)** | **19,300** | **(3.1)** | **118,789** | **(19.0)** | **505,699** | **(81.0)** |
| **Driver sex*** | | | | | | | | | | |
| Male | 153,232 | (69.5) | 58,470 | (26.5) | 8,635 | (3.9) | 44,764 | (20.6) | 172,925 | (79.4) |
| Female | 299,408 | (72.7) | 101,803 | (24.7) | 10,665 | (2.6) | 74,025 | (18.2) | 332,774 | (81.8) |
| **Driver age (yrs)*** | | | | | | | | | | |
| ≤20 | 27,540 | (70.2) | 9,404 | (24.0) | 2,286 | (5.8) | 10,657 | (27.4) | 28,313 | (72.7) |
| 21–29 | 110,663 | (68.3) | 46,106 | (28.5) | 5,220 | (3.2) | 23,119 | (14.4) | 137,209 | (85.6) |
| 30–39 | 171,429 | (72.4) | 59,322 | (25.1) | 5,891 | (2.5) | 40,515 | (17.4) | 192,740 | (82.6) |
| 40–49 | 95,870 | (75.1) | 28,315 | (22.2) | 3,458 | (2.7) | 27,810 | (22.1) | 98,196 | (77.9) |
| 50–59 | 28,749 | (71.2) | 10,139 | (25.1) | 1,519 | (3.8) | 9,763 | (24.5) | 30,147 | (75.5) |
| ≥60 | 18,389 | (69.9) | 6,987 | (26.6) | 926 | (3.5) | 6,925 | (26.6) | 19,094 | (73.4) |
| **Driver restraint use*** | | | | | | | | | | |
| Restrained | 446,687 | (72.3) | 157,931 | (25.6) | 13,458 | (2.2) | 114,697 | (18.8) | 495,796 | (81.2) |
| Unrestrained | 5,953 | (42.1) | 2,342 | (16.6) | 5,842 | (41.3) | 4,092 | (29.2) | 9,903 | (70.8) |
| **Driver airbag deployment*** | | | | | | | | | | |
| Deployed | 43,006 | (71.0) | 14,491 | (23.9) | 3,058 | (5.1) | 12,270 | (2.7) | 448,774 | (97.3) |
| Not deployed | 401,047 | (71.7) | 142,573 | (25.5) | 15,474 | (2.8) | 103,282 | (68.4) | 47,684 | (31.6) |
| Deployment not applicable | 8,587 | (68.4) | 3,209 | (25.5) | 768 | (6.1) | 3,237 | (25.9) | 9,241 | (74.1) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | |
| Suspected | 3,430 | (55.6) | 1,732 | (28.1) | 1,013 | (16.4) | 1,967 | (32.1) | 4,155 | (67.9) |
| Not suspected | 392,625 | (71.3) | 142,251 | (25.8) | 16,211 | (2.9) | 103,776 | (19.1) | 439,794 | (80.9) |
| **Driver distraction*,†** | | | | | | | | | | |
| Distracted | 44,420 | (70.0) | 16,429 | (25.9) | 2,656 | (4.2) | 14,240 | (22.5) | 49,008 | (77.5) |
| Not distracted | 351,635 | (71.2) | 127,554 | (25.8) | 14,568 | (3.0) | 91,503 | (18.8) | 394,941 | (81.2) |
| **Driver injury severity*** | | | | | | | | | | |
| Killed | 423 | (54.3) | 145 | (18.6) | 211 | (27.1) | 182 | (23.7) | 585 | (76.3) |
| Incapacitated | 5,137 | (64.4) | 1,809 | (22.7) | 1,032 | (12.9) | 1,871 | (23.6) | 6,050 | (76.4) |
| Not incapacitated | 19,784 | (67.9) | 7,180 | (24.6) | 2,179 | (7.5) | 6,524 | (22.6) | 22,392 | (77.4) |
| Possible injury | 68,556 | (70.7) | 24,502 | (25.3) | 3,905 | (4.0) | 17,360 | (18.1) | 78,720 | (81.9) |
| Not injured | 358,072 | (72.1) | 126,418 | (25.5) | 11,943 | (2.4) | 92,715 | (18.9) | 397,171 | (81.1) |
| Injured, severity unknown | 668 | (72.9) | 219 | (23.9) | 30 | (3.3) | 137 | (14.9) | 781 | (85.1) |

See table footnotes on next page.

**TABLE 3. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **452,640** | **(71.6)** | **160,273** | **(25.4)** | **19,300** | **(3.1)** | **118,789** | **(19.0)** | **505,699** | **(81.0)** |
| **Driver level of care*** | | | | | | | | | | |
| Not treated in hospital | 378,140 | (71.9) | 133,927 | (25.5) | 13,852 | (2.6) | 99,363 | (19.2) | 419,616 | (80.9) |
| Treated in emergency department | 71,049 | (70.5) | 25,130 | (24.9) | 4,628 | (4.6) | 18,178 | (18.2) | 81,888 | (81.8) |
| Hospitalized | 3,021 | (64.5) | 1,059 | (22.6) | 603 | (12.9) | 1,063 | (22.8) | 3,592 | (77.2) |
| Died | 429 | (53.5) | 157 | (19.6) | 217 | (27.0) | 185 | (23.5) | 602 | (76.5) |
| **Speed*,†** | | | | | | | | | | |
| Speed related | 16,731 | (68.9) | 5,849 | (24.1) | 1,715 | (7.1) | 5,241 | (21.7) | 18,910 | (78.3) |
| Not speed related | 385,313 | (71.3) | 139,569 | (25.8) | 15,625 | (2.9) | 101,643 | (19.1) | 431,366 | (80.9) |
| **Time of day** | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 418,458 | (71.9) | 146,597 | (25.2) | 16,645 | (2.9) | 109,012 | (19.0) | 465,568 | (81.0) |
| Night (9:00 p.m.–5:59 a.m.) | 35,453 | (67.5) | 14,207 | (27.0) | 2,878 | (5.5) | 10,310 | (19.9) | 41,605 | (80.1) |
| **Location†** | | | | | | | | | | |
| Urban (>5,000 population) | 248,788 | (71.8) | 87,379 | (25.2) | 10,148 | (2.9) | 59,470 | (17.5) | 280,707 | (82.5) |
| Rural (≤5,000 population) | 58,908 | (73.0) | 18,379 | (22.8) | 3,413 | (4.2) | 15,252 | (19.2) | 64,238 | (80.8) |
| **Initial impact point†** | | | | | | | | | | |
| No collision | 2,414 | (69.4) | 824 | (23.7) | 240 | (6.9) | 751 | (22.0) | 2,658 | (78.0) |
| Front | 155,024 | (69.6) | 59,691 | (26.8) | 7,931 | (3.6) | 49,380 | (22.5) | 169,764 | (77.5) |
| Right | 27,714 | (70.2) | 10,360 | (26.2) | 1,434 | (3.6) | 8,005 | (20.5) | 30,980 | (79.5) |
| Rear | 95,550 | (72.5) | 33,794 | (25.6) | 2,459 | (1.9) | 24,065 | (18.7) | 104,920 | (81.3) |
| Left | 28,324 | (70.0) | 10,889 | (26.9) | 1,247 | (3.1) | 8,097 | (20.3) | 31,818 | (79.7) |
| Other | 11,002 | (72.1) | 3,561 | (23.4) | 687 | (4.5) | 2,920 | (19.3) | 12,244 | (80.7) |
| **First harmful event†** | | | | | | | | | | |
| No collision | 5,996 | (65.7) | 2,228 | (24.4) | 907 | (9.9) | 1,923 | (21.5) | 7,013 | (78.5) |
| Motor vehicle in transport | 376,844 | (71.6) | 135,547 | (25.8) | 13,911 | (2.6) | 98,018 | (18.9) | 421,499 | (81.1) |
| Nonfixed object | 31,179 | (73.7) | 10,013 | (23.7) | 1,119 | (2.6) | 7,482 | (17.8) | 34,485 | (82.2) |
| Fixed object | 27,429 | (70.2) | 9,175 | (23.5) | 2,477 | (6.3) | 8,363 | (21.6) | 30,394 | (78.4) |
| **Vehicle age†** | | | | | | | | | | |
| Before 2002 | 155,015 | (70.5) | 56,443 | (25.7) | 8,410 | (3.8) | 45,681 | (20.8) | 173,870 | (79.2) |
| 2002 or later | 94,583 | (75.9) | 27,660 | (22.2) | 2,381 | (1.9) | 19,423 | (15.6) | 105,055 | (84.4) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 4. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–3 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **145,371** | **(79.9)** | **32,372** | **(17.8)** | **4,148** | **(2.3)** | **12,645** | **(7.0)** | **167,995** | **(93.0)** |
| **Driver sex*** | | | | | | | | | | |
| Male | 44,672 | (75.5) | 12,666 | (21.4) | 1,846 | (3.1) | 5,619 | (9.6) | 53,150 | (90.4) |
| Female | 100,699 | (82.1) | 19,706 | (16.1) | 2,302 | (1.9) | 7,026 | (5.8) | 114,845 | (94.2) |
| **Driver age (yrs)*** | | | | | | | | | | |
| ≤20 | 9,484 | (73.2) | 2,937 | (22.7) | 528 | (4.1) | 1,419 | (11.0) | 11,472 | (89.0) |
| 21–29 | 58,674 | (81.6) | 11,641 | (16.2) | 1,593 | (2.2) | 4,704 | (6.6) | 66,802 | (93.4) |
| 30–39 | 52,211 | (82.2) | 10,290 | (16.2) | 1,046 | (1.7) | 3,438 | (5.5) | 59,591 | (94.6) |
| 40–49 | 15,427 | (76.1) | 4,287 | (21.2) | 551 | (2.7) | 1,642 | (8.2) | 18,466 | (91.8) |
| 50–59 | 6,074 | (73.4) | 1,931 | (23.3) | 267 | (3.2) | 840 | (10.3) | 7,355 | (89.8) |
| ≥60 | 3,501 | (70.7) | 1,286 | (26.0) | 163 | (3.3) | 602 | (12.3) | 4,310 | (87.7) |
| **Driver restraint use*** | | | | | | | | | | |
| Restrained | 142,897 | (80.4) | 31,818 | (17.9) | 3,055 | (1.7) | 11,979 | (6.8) | 164,567 | (93.2) |
| Unrestrained | 2,473 | (60.0) | 554 | (13.5) | 1,093 | (26.5) | 666 | (16.3) | 3,428 | (83.7) |
| **Driver airbag deployment*** | | | | | | | | | | |
| Deployed | 14,725 | (81.82) | 2,679 | (14.9) | 592 | (3.3) | 1,153 | (6.4) | 16,757 | (93.6) |
| Not deployed | 127,857 | (79.69) | 29,176 | (18.2) | 3,404 | (2.1) | 11,107 | (7.0) | 148,175 | (93.0) |
| Deployment not applicable | 2,789 | (80.66) | 517 | (14.9) | 152 | (4.4) | 386 | (11.2) | 3,063 | (88.8) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | |
| Suspected | 982 | (61.0) | 409 | (25.4) | 219 | (13.6) | 315 | (19.6) | 1,290 | (80.4) |
| Not suspected | 126,621 | (79.4) | 29,391 | (18.4) | 3,436 | (2.2) | 11,235 | (7.1) | 146,980 | (92.9) |
| **Driver distraction*,†** | | | | | | | | | | |
| Distracted | 14,928 | (78.4) | 3,572 | (18.8) | 545 | (2.9) | 1,669 | (8.8) | 17,333 | (91.2) |
| Not distracted | 112,675 | (79.3) | 26,228 | (18.5) | 3,109 | (2.2) | 9,881 | (7.0) | 130,938 | (93.0) |
| **Driver injury severity*** | | | | | | | | | | |
| Killed | 161 | (73.0) | 17 | (7.7) | 42 | (19.3) | 17 | (7.6) | 202 | (92.4) |
| Incapacitated | 1,710 | (76.6) | 356 | (16.0) | 165 | (7.4) | 206 | (9.3) | 2,018 | (90.7) |
| Not incapacitated | 6,795 | (78.9) | 1,394 | (16.2) | 421 | (4.9) | 712 | (8.3) | 7,860 | (91.7) |
| Possible injury | 22,868 | (78.7) | 5,288 | (18.2) | 899 | (3.1) | 1,749 | (6.1) | 27,166 | (94.0) |
| Not injured | 113,619 | (80.3) | 25,263 | (17.9) | 2,612 | (1.9) | 9,944 | (7.1) | 130,487 | (92.9) |
| Injured, severity unknown | 218 | (77.9) | 54 | (19.2) | 8 | (2.9) | 18 | (6.4) | 263 | (93.7) |

See table footnotes on next page.

**TABLE 4. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–3 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **145,371** | **(79.9)** | **32,372** | **(17.8)** | **4,148** | **(2.3)** | **12,645** | **(7.0)** | **167,995** | **(93.0)** |
| **Driver level of care*** | | | | | | | | | | |
| Not treated in hospital | 119,539 | (80.0) | 26,933 | (18.0) | 2,971 | (2.0) | 10,659 | (7.2) | 137,668 | (92.8) |
| Treated in emergency department | 24,676 | (79.8) | 5,213 | (16.9) | 1,034 | (3.3) | 1,840 | (6.0) | 28,957 | (94.0) |
| Hospitalized | 993 | (76.4) | 209 | (16.1) | 98 | (7.5) | 129 | (10.0) | 1,165 | (90.0) |
| Died | 163 | (72.5) | 17 | (7.8) | 44 | (19.8) | 17 | (7.7) | 205 | (92.3) |
| **Speed*,†** | | | | | | | | | | |
| Speed related | 5,491 | (77.9) | 1,230 | (17.4) | 332 | (4.7) | 658 | (9.4) | 6,376 | (90.7) |
| Not speed related | 123,647 | (79.4) | 28,769 | (18.5) | 3,339 | (2.1) | 10,983 | (7.1) | 143,546 | (92.9) |
| **Time of day** | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 135,664 | (80.7) | 28,979 | (17.2) | 3,534 | (2.1) | 11,311 | (6.8) | 155,692 | (93.2) |
| Night (9:00 p.m.–5:59 a.m.) | 10,068 | (70.6) | 3,519 | (24.7) | 670 | (4.7) | 1,421 | (10.0) | 12,755 | (90.0) |
| **Location†** | | | | | | | | | | |
| Urban (>5,000 population) | 80,876 | (79.0) | 19,158 | (18.7) | 2,410 | (2.4) | 6,418 | (6.3) | 94,995 | (93.7) |
| Rural (≤5,000 population) | 18,333 | (81.2) | 3,627 | (16.1) | 631 | (2.8) | 1,674 | (7.5) | 20,739 | (92.5) |
| **Initial impact point†** | | | | | | | | | | |
| No collision | 800 | (77.8) | 167 | (16.2) | 61 | (5.9) | 104 | (10.2) | 917 | (89.8) |
| Front | 50,367 | (78.9) | 11,758 | (18.4) | 1,698 | (2.7) | 5,561 | (8.8) | 57,661 | (91.2) |
| Right | 9,059 | (79.0) | 2,099 | (18.3) | 310 | (2.7) | 858 | (7.5) | 10,519 | (92.5) |
| Rear | 29,773 | (81.4) | 6,278 | (17.2) | 529 | (1.5) | 2,462 | (6.8) | 33,693 | (93.2) |
| Left | 9,169 | (79.2) | 2,191 | (18.9) | 211 | (1.8) | 863 | (7.5) | 10,625 | (92.5) |
| Other | 3,626 | (83.3) | 593 | (13.6) | 132 | (3.0) | 327 | (7.5) | 4,010 | (92.5) |
| **First harmful event†** | | | | | | | | | | |
| No collision | 2,018 | (74.5) | 512 | (18.9) | 180 | (6.6) | 284 | (10.6) | 2,398 | (89.4) |
| Motor vehicle in transport | 121,297 | (79.7) | 27,763 | (18.2) | 3,160 | (2.1) | 10,399 | (6.9) | 140,712 | (93.1) |
| Nonfixed object | 9,349 | (81.5) | 1,901 | (16.6) | 228 | (2.0) | 733 | (6.4) | 10,692 | (93.6) |
| Fixed object | 9,694 | (80.8) | 1,830 | (15.3) | 476 | (4.0) | 1,050 | (8.8) | 10,898 | (91.2) |
| **Vehicle age†** | | | | | | | | | | |
| Before 2002 | 48,953 | (77.5) | 12,449 | (19.7) | 1,782 | (2.8) | 5,088 | (8.1) | 58,052 | (91.9) |
| 2002 or later | 29,514 | (82.6) | 5,724 | (16.0) | 513 | (1.4) | 1,642 | (4.6) | 34,089 | (95.4) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 5. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 4–7 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **75,454** | **(36.0)** | **127,901** | **(61.0)** | **6,432** | **(3.1)** | **28,326** | **(13.7)** | **178,247** | **(86.3)** |
| **Driver sex*** | | | | | | | | | | |
| Male | 22,970 | (32.1) | 45,803 | (64.1) | 2,737 | (3.8) | 11,396 | (16.2) | 59,122 | (83.8) |
| Female | 52,484 | (38.0) | 82,098 | (59.4) | 3,695 | (2.7) | 16,930 | (12.4) | 119,125 | (87.6) |
| **Driver age (yrs)*** | | | | | | | | | | |
| ≤20 | 1,990 | (22.1) | 6,467 | (71.7) | 564 | (6.3) | 2,035 | (22.7) | 6,918 | (77.3) |
| 21–29 | 21,201 | (36.7) | 34,465 | (59.7) | 2,110 | (3.7) | 8,185 | (14.4) | 48,805 | (85.6) |
| 30–39 | 32,661 | (39.0) | 49,032 | (58.6) | 2,004 | (2.4) | 9,622 | (11.7) | 72,588 | (88.3) |
| 40–49 | 13,238 | (34.6) | 24,029 | (62.8) | 1,008 | (2.6) | 4,775 | (12.7) | 32,896 | (87.3) |
| 50–59 | 3,732 | (30.1) | 8,208 | (66.1) | 475 | (3.8) | 2,106 | (17.2) | 10,152 | (82.8) |
| ≥60 | 2,633 | (30.6) | 5,701 | (66.3) | 271 | (3.2) | 1,604 | (18.9) | 6,887 | (81.1) |
| **Driver restraint use*** | | | | | | | | | | |
| Restrained | 74,537 | (36.4) | 126,113 | (61.5) | 4,410 | (2.2) | 27,083 | (13.4) | 174,807 | (86.6) |
| Unrestrained | 917 | (19.4) | 1,788 | (37.8) | 2,022 | (42.8) | 1,243 | (26.5) | 3,440 | (73.5) |
| **Driver airbag deployment*** | | | | | | | | | | |
| Deployed | 7,345 | (36.4) | 11,811 | (58.5) | 1,026 | (5.1) | 3,143 | (15.8) | 16,773 | (84.2) |
| Not deployed | 66,807 | (36.0) | 113,398 | (61.2) | 5,147 | (2.8) | 24,293 | (13.3) | 158,131 | (86.7) |
| Deployment not applicable | 1,302 | (30.6) | 2,692 | (63.3) | 260 | (6.1) | 891 | (21.0) | 3,343 | (79.0) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | |
| Suspected | 466 | (21.3) | 1,322 | (60.5) | 396 | (18.2) | 593 | (27.4) | 1,573 | (72.6) |
| Not suspected | 63,922 | (35.1) | 112,860 | (62.0) | 5,329 | (2.9) | 24,774 | (13.8) | 154,173 | (86.2) |
| **Driver distraction*,†** | | | | | | | | | | |
| Distracted | 7,213 | (34.4) | 12,857 | (61.3) | 909 | (4.3) | 3,697 | (17.7) | 17,186 | (82.3) |
| Not distracted | 57,175 | (35.0) | 101,326 | (62.0) | 4,816 | (3.0) | 21,670 | (13.5) | 138,561 | (86.5) |
| **Driver injury severity*** | | | | | | | | | | |
| Killed | 67 | (24.6) | 128 | (47.2) | 77 | (28.2) | 55 | (20.8) | 211 | (79.2) |
| Incapacitated | 872 | (32.6) | 1,452 | (54.4) | 348 | (13.0) | 525 | (19.8) | 2,130 | (80.2) |
| Not incapacitated | 3,146 | (32.5) | 5,785 | (59.8) | 746 | (7.1) | 1,767 | (18.4) | 7,821 | (81.6) |
| Possible injury | 11,375 | (35.6) | 19,215 | (60.1) | 1,360 | (4.3) | 4,043 | (12.8) | 27,561 | (87.2) |
| Not injured | 59,860 | (36.3) | 101,155 | (61.3) | 3,893 | (2.4) | 21,907 | (13.5) | 140,244 | (86.5) |
| Injured, severity unknown | 136 | (43.7) | 165 | (53.4) | 9 | (2.9) | 30 | (9.6) | 280 | (90.5) |

See table footnotes on next page.

**TABLE 5. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 4–7 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **75,454** | **(36.0)** | **127,901** | **(61.0)** | **6,432** | **(3.1)** | **28,326** | **(13.7)** | **178,247** | **(86.3)** |
| **Driver level of care*** | | | | | | | | | | |
| Not treated in hospital | 63,003 | (36.1) | 106,994 | (61.3) | 4,529 | (2.6) | 23,687 | (13.8) | 147,945 | (86.2) |
| Treated in emergency department | 11,904 | (35.6) | 19,918 | (59.6) | 1,622 | (4.9) | 4,313 | (13.0) | 28,825 | (87.0) |
| Hospitalized | 478 | (31.2) | 850 | (55.5) | 204 | (13.3) | 270 | (17.7) | 1,255 | (82.3) |
| Died | 68 | (23.9) | 140 | (48.9) | 78 | (27.2) | 57 | (20.5) | 222 | (79.5) |
| **Speed*,†** | | | | | | | | | | |
| Speed related | 2,639 | (33.7) | 4,619 | (58.9) | 586 | (7.5) | 1,325 | (17.0) | 6,463 | (83.0) |
| Not speed related | 63,055 | (35.2) | 110,800 | (61.9) | 5,174 | (2.9) | 24,292 | (13.8) | 151,596 | (86.2) |
| **Time of day** | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 70,963 | (36.5) | 117,618 | (60.6) | 5,627 | (2.9) | 26,033 | (13.6) | 165,178 | (86.4) |
| Night (9:00 p.m.–5:59 a.m.) | 4,673 | (28.8) | 10,688 | (65.8) | 891 | (5.5) | 2,447 | (15.3) | 13,582 | (84.7) |
| **Location†** | | | | | | | | | | |
| Urban (>5,000 population) | 42,651 | (37.3) | 68,221 | (59.7) | 3,409 | (3.0) | 13,350 | (12.0) | 98,309 | (88.0) |
| Rural (≤5,000 population) | 10,135 | (39.0) | 14,752 | (56.7) | 1,122 | (4.3) | 3,525 | (13.8) | 22,009 | (86.2) |
| **Initial impact point†** | | | | | | | | | | |
| No collision | 373 | (33.9) | 658 | (59.7) | 72 | (6.5) | 188 | (17.3) | 897 | (82.7) |
| Front | 24,425 | (32.5) | 47,933 | (63.8) | 2,727 | (3.6) | 12,946 | (17.6) | 60,652 | (82.4) |
| Right | 4,458 | (33.8) | 8,262 | (62.6) | 485 | (3.7) | 1,982 | (15.3) | 11,015 | (84.8) |
| Rear | 16,006 | (36.1) | 27,516 | (62.1) | 813 | (1.8) | 5,606 | (13.0) | 37,514 | (87.0) |
| Left | 4,440 | (32.7) | 8,698 | (64.1) | 424 | (3.1) | 2,066 | (15.5) | 11,281 | (84.5) |
| Other | 1,956 | (38.0) | 2,968 | (57.7) | 224 | (4.4) | 725 | (14.2) | 4,392 | (85.8) |
| **First harmful event†** | | | | | | | | | | |
| No collision | 922 | (31.6) | 1,716 | (58.9) | 276 | (9.5) | 511 | (17.9) | 2,349 | (82.1) |
| Motor vehicle in transport | 62,752 | (35.8) | 107,783 | (61.5) | 4,639 | (2.7) | 23,158 | (13.4) | 149,129 | (86.6) |
| Nonfixed object | 5,312 | (38.5) | 8,111 | (58.9) | 361 | (2.6) | 1,687 | (12.4) | 11,972 | (87.7) |
| Fixed object | 4,443 | (35.1) | 7,344 | (58.0) | 872 | (6.9) | 2,181 | (17.4) | 10,347 | (82.6) |
| **Vehicle age†** | | | | | | | | | | |
| Before 2002 | 25,668 | (35.4) | 43,994 | (60.7) | 2,851 | (3.9) | 11,396 | (15.7) | 61,031 | (84.3) |
| 2002 or later | 17,890 | (44.1) | 21,936 | (54.1) | 726 | (1.8) | 3,897 | (9.6) | 36,611 | (90.4) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 6. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 8–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|
| | Restrained | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **231,815** | **(96.4)** | **8,720** | **(3.6)** | **77,818** | **(32.8)** | **159,456** | **(67.2)** |
| **Driver sex** | | | | | | | | |
| Male | 85,590 | (95.5) | 4,053 | (4.5) | 27,749 | (31.4) | 60,652 | (68.6) |
| Female | 146,225 | (96.9) | 4,667 | (3.1) | 50,069 | (33.6) | 98,804 | (66.4) |
| **Driver age (yrs)*** | | | | | | | | |
| ≤20 | 16,066 | (93.1) | 1,193 | (6.9) | 7,203 | (42.1) | 9,922 | (57.9) |
| 21–29 | 30,788 | (95.3) | 1,516 | (4.7) | 10,231 | (32.1) | 21,602 | (67.9) |
| 30–39 | 86,557 | (96.8) | 2,841 | (3.2) | 27,456 | (31.2) | 60,561 | (68.8) |
| 40–49 | 67,205 | (97.3) | 1,899 | (2.8) | 21,392 | (31.4) | 46,834 | (68.7) |
| 50–59 | 18,943 | (96.1) | 778 | (3.9) | 6,817 | (35.0) | 12,640 | (65.0) |
| ≥60 | 12,255 | (96.1) | 492 | (3.9) | 4,719 | (37.4) | 7,897 | (62.6) |
| **Driver restraint use*** | | | | | | | | |
| Restrained | 229,253 | (97.5) | 5,993 | (2.6) | 75,635 | (32.6) | 156,422 | (67.4) |
| Unrestrained | 2,563 | (48.5) | 2,726 | (51.5) | 2,183 | (41.9) | 3,034 | (58.2) |
| **Driver airbag deployment*** | | | | | | | | |
| Deployed | 20,937 | (93.6) | 1,440 | (6.4) | 7,975 | (36.0) | 14,154 | (64.0) |
| Not deployed | 206,381 | (96.8) | 6,924 | (3.3) | 67,882 | (32.3) | 142,467 | (67.7) |
| Deployment not applicable | 4,498 | (92.7) | 356 | (7.3) | 1,961 | (40.9) | 2,835 | (59.1) |
| **Driver alcohol/drug use*,†** | | | | | | | | |
| Suspected | 1,982 | (83.3) | 398 | (16.7) | 1,059 | (45.1) | 1,292 | (54.9) |
| Not suspected | 202,083 | (96.5) | 7,446 | (3.56) | 67,767 | (32.8) | 138,641 | (67.2) |
| **Driver distraction*,†** | | | | | | | | |
| Distracted | 22,279 | (94.9) | 1,201 | (5.1) | 8,874 | (38.0) | 14,490 | (62.0) |
| Not distracted | 181,786 | (96.5) | 6,643 | (3.5) | 59,952 | (32.3) | 125,443 | (67.7) |
| **Driver injury severity*** | | | | | | | | |
| Killed | 195 | (67.9) | 92 | (32.1) | 110 | (38.9) | 172 | (61.1) |
| Incapacitated | 2,555 | (83.1) | 518 | (16.9) | 1,140 | (37.5) | 1,903 | (62.6) |
| Not incapacitated | 9,843 | (90.7) | 1,012 | (9.3) | 4,045 | (37.6) | 6,710 | (62.4) |
| Possible injury | 34,311 | (95.4) | 1,645 | (4.6) | 11,569 | (32.5) | 23,993 | (67.5) |
| Not injured | 184,596 | (97.1) | 5,438 | (2.9) | 60,865 | (32.5) | 126,441 | (67.5) |
| Injured, severity unknown | 315 | (96.0) | 13 | (4.0) | 90 | (27.5) | 237 | (72.5) |

See table footnotes on next page.

**TABLE 6. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 8–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restraint use | | | | Seating position | | | |
|---|---|---|---|---|---|---|---|---|
| | Restrained | | Unrestrained | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **231,815** | **(96.4)** | **8,720** | **(3.6)** | **77,818** | **(32.8)** | **159,456** | **(67.2)** |
| **Driver level of care*** | | | | | | | | |
| Not treated in hospital | 195,598 | (96.9) | 6,352 | (3.2) | 65,018 | (32.7) | 134,003 | (67.3) |
| Treated in emergency department | 34,469 | (94.6) | 1,973 | (5.4) | 12,025 | (33.3) | 24,106 | (66.7) |
| Hospitalized | 1,550 | (83.8) | 300 | (16.2) | 664 | (36.2) | 1,172 | (63.8) |
| Died | 198 | (67.7) | 95 | (32.3) | 111 | (38.7) | 175 | (61.3) |
| **Speed*,†** | | | | | | | | |
| Speed related | 8,601 | (91.5) | 797 | (8.5) | 3,258 | (34.9) | 6,071 | (65.1) |
| Not speed related | 198,611 | (96.5) | 7,112 | (3.5) | 66,367 | (32.8) | 136,225 | (67.2) |
| **Time of day** | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 211,831 | (96.6) | 7,484 | (3.4) | 71,667 | (33.1) | 144,698 | (66.9) |
| Night (9:00 p.m.–5:59 a.m.) | 20,713 | (94.0) | 1,317 | (6.0) | 6,442 | (29.7) | 15,268 | (70.3) |
| **Location†** | | | | | | | | |
| Urban (>5,000 population) | 125,262 | (96.7) | 4,329 | (3.3) | 39,702 | (31.2) | 87,402 | (68.8) |
| Rural (≤5,000 population) | 30,440 | (94.8) | 1,660 | (5.2) | 10,053 | (31.9) | 21,489 | (68.1) |
| **Initial impact point†** | | | | | | | | |
| No collision | 1,240 | (92.0) | 107 | (8.0) | 459 | (35.2) | 844 | (64.8) |
| Front | 80,232 | (95.8) | 3,507 | (4.2) | 30,874 | (37.5) | 51,451 | (62.5) |
| Right | 14,197 | (95.7) | 640 | (4.3) | 5,165 | (35.4) | 9,446 | (64.7) |
| Rear | 49,771 | (97.8) | 1,118 | (2.2) | 15,996 | (32.2) | 33,713 | (67.8) |
| Left | 14,715 | (96.0) | 612 | (4.0) | 5,169 | (34.3) | 9,913 | (65.7) |
| Other | 5,420 | (94.3) | 331 | (5.8) | 1,868 | (32.7) | 3,842 | (67.3) |
| **First harmful event†** | | | | | | | | |
| No collision | 3,056 | (87.1) | 451 | (12.9) | 1,128 | (33.2) | 2,266 | (66.8) |
| Motor vehicle in transport | 192,795 | (96.9) | 6,112 | (3.1) | 64,461 | (32.9) | 131,659 | (67.1) |
| Nonfixed object | 16,518 | (96.9) | 530 | (3.1) | 5,063 | (30.0) | 11,821 | (70.0) |
| Fixed object | 13,292 | (92.2) | 1,129 | (7.8) | 5,132 | (35.9) | 9,149 | (64.1) |
| **Vehicle age†** | | | | | | | | |
| Before 2002 | 80,394 | (95.5) | 3,776 | (4.5) | 29,197 | (34.8) | 54,786 | (65.2) |
| 2002 or later | 47,179 | (97.6) | 1,141 | (2.4) | 13,883 | (28.8) | 34,355 | (71.2) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 7. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **85,123** | **(18.9)** | **364,774** | **(81.1)** | **29,236** | **(18.7)** | **126,931** | **(81.3)** | **4,430** | **(24.0)** | **13,994** | **(76.0)** |
| **Driver sex*** | | | | | | | | | | | | |
| Male | 30,562 | (20.1) | 121,675 | (79.9) | 12,174 | (21.3) | 45,034 | (78.7) | 2,028 | (24.6) | 6,216 | (75.4) |
| Female | 54,561 | (18.3) | 243,099 | (81.7) | 17,062 | (17.2) | 81,897 | (82.8) | 2,402 | (23.6) | 7,778 | (76.4) |
| **Driver age (yrs)*** | | | | | | | | | | | | |
| ≤20 | 7,383 | (26.9) | 20,074 | (73.1) | 2,584 | (27.8) | 6,720 | (72.2) | 690 | (31.2) | 1,519 | (68.8) |
| 21–29 | 13,351 | (12.1) | 96,914 | (87.9) | 8,571 | (19.0) | 36,450 | (81.0) | 1,198 | (23.8) | 3,844 | (76.2) |
| 30–39 | 29,988 | (17.6) | 140,248 | (82.4) | 9,196 | (16.0) | 48,247 | (84.0) | 1,331 | (23.9) | 4,245 | (76.1) |
| 40–49 | 22,301 | (23.5) | 72,810 | (76.6) | 4,786 | (17.3) | 22,822 | (82.7) | 723 | (22.0) | 2,564 | (78.0) |
| 50–59 | 7,192 | (25.2) | 21,353 | (74.8) | 2,295 | (23.1) | 7,647 | (76.9) | 276 | (19.4) | 1,147 | (80.6) |
| ≥60 | 4,908 | (26.8) | 13,375 | (73.2) | 1,804 | (26.3) | 5,045 | (73.7) | 212 | (23.9) | 675 | (76.1) |
| **Driver restraint use*** | | | | | | | | | | | | |
| Restrained | 83,916 | (18.9) | 360,042 | (81.1) | 28,569 | (18.6) | 125,281 | (81.4) | 2,212 | (38.6) | 3,521 | (61.4) |
| Unrestrained | 1,207 | (20.3) | 4,732 | (79.7) | 667 | (28.8) | 1,650 | (71.2) | 2,218 | (17.5) | 10,473 | (82.5) |
| **Driver airbag deployment*** | | | | | | | | | | | | |
| Deployed | 8,401 | (19.6) | 34,413 | (80.4) | 3,033 | (21.4) | 11,146 | (78.6) | 836 | (28.2) | 2,125 | (71.8) |
| Not deployed | 74,508 | (18.7) | 324,005 | (81.3) | 25,395 | (18.3) | 113,391 | (81.7) | 3,379 | (22.9) | 11,378 | (77.1) |
| Deployment not applicable | 2,214 | (25.8) | 6,356 | (74.2) | 808 | (25.2) | 2,394 | (74.8) | 215 | (30.5) | 491 | (69.6) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | | | |
| Suspected | 1,001 | (29.3) | 2,417 | (70.7) | 580 | (33.7) | 1,141 | (66.3) | 386 | (39.3) | 597 | (60.7) |
| Not suspected | 74,152 | (19.0) | 315,784 | (81.0) | 26,050 | (18.9) | 112,125 | (81.2) | 3,574 | (23.1) | 11,886 | (76.9) |
| **Driver distraction*,†** | | | | | | | | | | | | |
| Distracted | 9,751 | (22.0) | 34,604 | (78.0) | 3,758 | (23.0) | 12,560 | (77.0) | 731 | (28.4) | 1,845 | (71.6) |
| Not distracted | 65,402 | (18.7) | 283,597 | (81.3) | 22,872 | (18.5) | 100,706 | (81.5) | 3,229 | (23.3) | 10,638 | (76.7) |
| **Driver injury severity*** | | | | | | | | | | | | |
| Killed | 81 | (19.3) | 339 | (80.7) | 44 | (31.0) | 98 | (69.0) | 57 | (27.7) | 149 | (72.3) |
| Incapacitated | 1,123 | (22.0) | 4,007 | (78.1) | 445 | (24.8) | 1,353 | (75.3) | 303 | (30.5) | 690 | (69.5) |
| Not incapacitated | 4,294 | (21.8) | 15,435 | (78.2) | 1,624 | (22.9) | 5,459 | (77.1) | 605 | (28.8) | 1,498 | (71.2) |
| Possible injury | 12,444 | (18.2) | 55,770 | (81.8) | 4,068 | (16.9) | 19,994 | (83.1) | 849 | (22.3) | 2,956 | (77.7) |
| Not injured | 67,079 | (18.9) | 288,657 | (81.1) | 23,022 | (18.7) | 99,841 | (81.3) | 2,614 | (23.2) | 8,673 | (76.8) |
| Injured, severity unknown | 102 | (15.3) | 566 | (84.7) | 33 | (15.1) | 186 | (84.9) | 2 | (6.7) | 28 | (93.3) |

See table footnotes on next page.

**TABLE 7. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **85,123** | **(18.9)** | **364,774** | **(81.1)** | **29,236** | **(18.7)** | **126,931** | **(81.3)** | **4,430** | **(24.0)** | **13,994** | **(76.0)** |
| **Driver level of care*** | | | | | | | | | | | | |
| Not treated in hospital | 71,442 | (19.0) | 304,203 | (81.0) | 24,730 | (19.0) | 105,478 | (81.0) | 3,191 | (24.3) | 9,935 | (75.7) |
| Treated in emergency department | 12,962 | (18.3) | 57,850 | (81.7) | 4,213 | (17.0) | 20,542 | (83.0) | 1,003 | (22.3) | 3,496 | (77.7) |
| Hospitalized | 638 | (21.2) | 2,378 | (78.8) | 247 | (23.5) | 804 | (76.5) | 178 | (30.2) | 410 | (69.8) |
| Died | 83 | (19.5) | 343 | (80.5) | 45 | (29.7) | 107 | (70.3) | 57 | (27.3) | 152 | (72.8) |
| **Speed*,†** | | | | | | | | | | | | |
| Speed related | 3,436 | (20.6) | 13,261 | (79.4) | 1,325 | (22.8) | 4,477 | (77.2) | 480 | (29.0) | 1,173 | (71.0) |
| Not speed related | 72,638 | (19.0) | 309,974 | (81.0) | 25,509 | (18.8) | 110,007 | (81.2) | 3,496 | (23.5) | 11,385 | (76.5) |
| **Time of day** | | | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 78,650 | (18.9) | 337,317 | (81.1) | 26,488 | (18.6) | 116,267 | (81.5) | 3,874 | (24.4) | 11,985 | (75.6) |
| Night (9:00 p.m.–5:59 a.m.) | 6,780 | (19.3) | 28,419 | (80.7) | 2,899 | (20.8) | 11,042 | (79.2) | 631 | (22.8) | 2,143 | (77.3) |
| **Location†** | | | | | | | | | | | | |
| Urban (>5,000 population) | 43,458 | (17.6) | 203,125 | (82.4) | 14,109 | (16.8) | 69,835 | (83.2) | 1,903 | (19.7) | 7,747 | (80.3) |
| Rural (≤5,000 population) | 10,793 | (18.5) | 47,661 | (81.5) | 3,518 | (19.8) | 14,276 | (80.2) | 941 | (29.0) | 2,300 | (71.0) |
| **Initial impact point†** | | | | | | | | | | | | |
| No collision | 514 | (21.4) | 1,885 | (78.6) | 172 | (21.4) | 633 | (78.6) | 64 | (31.4) | 140 | (68.6) |
| Front | 33,773 | (22.0) | 120,060 | (78.1) | 13,223 | (22.9) | 44,554 | (77.1) | 2,385 | (31.7) | 5,150 | (68.4) |
| Right | 5,630 | (20.5) | 21,902 | (79.6) | 2,020 | (20.0) | 8,087 | (80.0) | 356 | (26.5) | 990 | (73.6) |
| Rear | 17,646 | (18.7) | 76,834 | (81.3) | 5,896 | (18.3) | 26,345 | (81.7) | 523 | (23.1) | 1,742 | (76.9) |
| Left | 5,669 | (20.2) | 22,460 | (79.9) | 2,134 | (20.1) | 8,479 | (79.9) | 294 | (25.1) | 879 | (74.9) |
| Other | 2,040 | (18.6) | 8,942 | (81.4) | 684 | (19.4) | 2,846 | (80.6) | 196 | (30.1) | 456 | (69.9) |
| **First harmful event†** | | | | | | | | | | | | |
| No collision | 1,178 | (19.8) | 4,782 | (80.2) | 501 | (23.0) | 1,677 | (77.0) | 244 | (30.6) | 553 | (69.4) |
| Motor vehicle in transport | 70,848 | (18.9) | 303,541 | (81.1) | 24,253 | (18.4) | 107,553 | (81.6) | 2,917 | (21.9) | 10,406 | (78.1) |
| Nonfixed object | 5,526 | (17.8) | 25,520 | (82.2) | 1,705 | (17.3) | 8,145 | (82.7) | 252 | (23.5) | 820 | (76.5) |
| Fixed object | 5,511 | (20.2) | 21,832 | (79.8) | 2,133 | (23.6) | 6,901 | (76.4) | 719 | (30.2) | 1,660 | (69.8) |
| **Vehicle age†** | | | | | | | | | | | | |
| Before 2002 | 31,831 | (20.5) | 123,124 | (79.5) | 11,646 | (20.7) | 44,730 | (79.3) | 2,204 | (26.8) | 6,016 | (73.2) |
| 2002 or later | 15,033 | (15.9) | 79,503 | (84.1) | 3,963 | (14.4) | 23,654 | (85.7) | 427 | (18.4) | 1,897 | (81.6) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 8. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–3 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **6,056** | **(4.2)** | **139,314** | **(95.8)** | **5,823** | **(18.6)** | **25,412** | **(81.4)** | **766** | **(19.0)** | **3,268** | **(81.0)** |
| **Driver sex*** | | | | | | | | | | | | |
| Male | 2,466 | (5.5) | 42,205 | (94.5) | 2,796 | (22.7) | 9,505 | (77.3) | 357 | (19.9) | 1,439 | (80.1) |
| Female | 3,590 | (3.6) | 97,109 | (96.4) | 3,027 | (16.0) | 15,907 | (84.0) | 409 | (18.3) | 1,829 | (81.7) |
| **Driver age (yrs)*** | | | | | | | | | | | | |
| ≤20 | 465 | (4.9) | 9,019 | (95.1) | 837 | (28.9) | 2,055 | (71.1) | 118 | (22.9) | 398 | (77.1) |
| 21–29 | 2,508 | (4.3) | 56,166 | (95.7) | 1,897 | (16.8) | 9,381 | (83.2) | 299 | (19.2) | 1,255 | (80.8) |
| 30–39 | 1,872 | (3.6) | 50,338 | (96.4) | 1,393 | (14.2) | 8,416 | (85.8) | 172 | (17.1) | 837 | (82.9) |
| 40–49 | 736 | (4.8) | 14,691 | (95.2) | 812 | (19.6) | 3,332 | (80.4) | 94 | (17.5) | 444 | (82.5) |
| 50–59 | 307 | (5.1) | 5,767 | (94.9) | 483 | (25.9) | 1,380 | (74.1) | 50 | (19.3) | 208 | (80.7) |
| ≥60 | 167 | (4.8) | 3,333 | (95.2) | 402 | (32.1) | 849 | (67.9) | 33 | (20.4) | 127 | (79.6) |
| **Driver restraint use*** | | | | | | | | | | | | |
| Restrained | 5,861 | (4.1) | 137,036 | (95.9) | 5,664 | (18.5) | 25,029 | (81.6) | 454 | (15.4) | 2,502 | (84.6) |
| Unrestrained | 195 | (7.9) | 2,278 | (92.1) | 159 | (29.4) | 384 | (70.6) | 312 | (28.9) | 766 | (71.1) |
| **Driver airbag deployment*** | | | | | | | | | | | | |
| Deployed | 521 | (3.5) | 14,204 | (96.5) | 513 | (19.7) | 2,094 | (80.3) | 118 | (20.4) | 459 | (79.6) |
| Not deployed | 5,287 | (4.1) | 122,570 | (95.9) | 5,204 | (18.5) | 22,910 | (81.5) | 615 | (18.6) | 2,696 | (81.4) |
| Deployment not applicable | 247 | (8.9) | 2,541 | (91.1) | 106 | (20.6) | 409 | (79.4) | 33 | (22.5) | 113 | (77.5) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | | | |
| Suspected | 82 | (8.4) | 900 | (91.7) | 158 | (38.9) | 248 | (61.1) | 74 | (34.4) | 142 | (65.7) |
| Not suspected | 5,276 | (4.3) | 121,345 | (95.8) | 5,358 | (19.0) | 22,905 | (81.0) | 601 | (18.1) | 2,730 | (82.0) |
| **Driver distraction*,†** | | | | | | | | | | | | |
| Distracted | 807 | (5.4) | 14,121 | (94.6) | 745 | (21.1) | 2,793 | (78.9) | 117 | (21.8) | 419 | (78.3) |
| Not distracted | 4,550 | (4.0) | 108,124 | (96.0) | 4,771 | (19.0) | 20,360 | (81.0) | 559 | (18.6) | 2,453 | (81.4) |
| **Driver injury severity*** | | | | | | | | | | | | |
| Killed | 4 | (2.6) | 156 | (97.4) | 4 | (24.7) | 13 | (75.3) | 8 | (20.0) | 33 | (80.0) |
| Incapacitated | 103 | (6.0) | 1,607 | (94.0) | 69 | (19.7) | 282 | (80.3) | 34 | (20.9) | 128 | (79.1) |
| Not incapacitated | 338 | (5.0) | 6,457 | (95.0) | 280 | (20.5) | 1,089 | (79.6) | 94 | (23.0) | 314 | (77.0) |
| Possible injury | 827 | (3.6) | 22,042 | (96.4) | 780 | (15.1) | 4,386 | (84.9) | 143 | (16.2) | 738 | (83.8) |
| Not injured | 4,777 | (4.2) | 108,842 | (95.8) | 4,681 | (19.3) | 19,598 | (80.7) | 486 | (19.2) | 2,048 | (80.8) |
| Injured, severity unknown | 8 | (3.5) | 211 | (96.5) | 9 | (17.1) | 45 | (82.9) | 1 | (12.2) | 7 | (87.8) |

See table footnotes on next page.

**TABLE 8. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 1–3 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **6,056** | **(4.2)** | **139,314** | **(95.8)** | **5,823** | **(18.6)** | **25,412** | **(81.4)** | **766** | **(19.0)** | **3,268** | **(81.0)** |
| **Driver level of care*** | | | | | | | | | | | | |
| Not treated in hospital | 5,096 | (4.3) | 114,443 | (95.7) | 4,991 | (19.3) | 20,916 | (80.7) | 572 | (19.9) | 2,309 | (80.1) |
| Treated in emergency department | 903 | (3.7) | 23,773 | (96.3) | 778 | (15.2) | 4,329 | (84.8) | 159 | (15.7) | 856 | (84.3) |
| Hospitalized | 53 | (5.3) | 940 | (94.7) | 50 | (24.4) | 155 | (75.6) | 26 | (27.2) | 70 | (72.8) |
| Died | 5 | (2.8) | 158 | (97.2) | 4 | (25.3) | 13 | (74.7) | 8 | (19.5) | 34 | (80.5) |
| **Speed*,†** | | | | | | | | | | | | |
| Speed related | 268 | (4.9) | 5,223 | (95.1) | 311 | (25.6) | 905 | (74.4) | 79 | (24.1) | 248 | (76.0) |
| Not speed related | 5,159 | (4.2) | 118,488 | (95.8) | 5,226 | (18.9) | 22,422 | (81.1) | 598 | (18.5) | 2,636 | (81.5) |
| **Time of day** | | | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 5,639 | (4.2) | 130,025 | (95.8) | 5,020 | (18.0) | 22,887 | (82.0) | 652 | (19.0) | 2,781 | (81.0) |
| Night (9:00 p.m.–5:59 a.m.) | 446 | (4.4) | 9,622 | (95.6) | 839 | (24.3) | 2,614 | (75.7) | 137 | (20.9) | 518 | (79.1) |
| **Location†** | | | | | | | | | | | | |
| Urban (>5,000 population) | 2,867 | (3.5) | 78,009 | (96.5) | 3,183 | (17.5) | 15,018 | (82.5) | 367 | (15.7) | 1,968 | (84.3) |
| Rural (≤5,000 population) | 773 | (4.2) | 17,559 | (95.8) | 766 | (22.1) | 2,703 | (77.9) | 135 | (22.0) | 477 | (78.0) |
| **Initial impact point†** | | | | | | | | | | | | |
| No collision | 47 | (5.9) | 754 | (94.2) | 39 | (24.1) | 123 | (75.9) | 18 | (31.1) | 40 | (68.9) |
| Front | 2,634 | (5.2) | 47,733 | (94.8) | 2,517 | (22.4) | 8,700 | (77.6) | 410 | (25.0) | 1,228 | (75.0) |
| Right | 414 | (4.6) | 8,645 | (95.4) | 377 | (18.7) | 1,640 | (81.3) | 67 | (22.4) | 234 | (77.6) |
| Rear | 1,190 | (4.0) | 28,582 | (96.0) | 1,174 | (20.0) | 4,707 | (80.0) | 98 | (19.6) | 404 | (80.4) |
| Left | 426 | (4.7) | 8,743 | (95.4) | 394 | (18.7) | 1,719 | (81.3) | 42 | (20.5) | 163 | (79.5) |
| Other | 179 | (4.9) | 3,447 | (95.1) | 110 | (18.8) | 473 | (81.2) | 38 | (29.6) | 91 | (70.5) |
| **First harmful event†** | | | | | | | | | | | | |
| No collision | 106 | (5.2) | 1,912 | (94.8) | 123 | (24.8) | 374 | (75.2) | 55 | (33.3) | 111 | (66.9) |
| Motor vehicle in transport | 5,014 | (4.1) | 116,283 | (95.9) | 4,859 | (18.2) | 21,876 | (81.8) | 527 | (17.1) | 2,553 | (82.9) |
| Nonfixed object | 336 | (3.6) | 9,013 | (96.4) | 348 | (18.8) | 1,504 | (81.2) | 48 | (21.5) | 175 | (78.5) |
| Fixed object | 479 | (4.9) | 9,215 | (95.1) | 450 | (25.2) | 1,339 | (74.9) | 121 | (26.0) | 344 | (74.0) |
| **Vehicle age†** | | | | | | | | | | | | |
| Before 2002 | 2,380 | (4.9) | 46,573 | (95.1) | 2,352 | (18.9) | 10,075 | (81.1) | 357 | (20.3) | 1,404 | (79.7) |
| 2002 or later | 773 | (2.6) | 28,741 | (97.4) | 802 | (14.1) | 4,906 | (86.0) | 67 | (13.2) | 443 | (86.9) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 9. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 4–7 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **3,584** | **(4.8)** | **71,870** | **(95.3)** | **23,413** | **(18.7)** | **101,520** | **(81.3)** | **1,328** | **(21.5)** | **4,858** | **(78.5)** |
| **Driver sex*** | | | | | | | | | | | | |
| Male | 1,397 | (6.1) | 21,573 | (93.9) | 9,379 | (20.9) | 35,529 | (79.1) | 620 | (23.5) | 2,020 | (76.5) |
| Female | 2,187 | (4.2) | 50,297 | (95.8) | 14,034 | (17.5) | 65,991 | (82.5) | 708 | (20.0) | 2,838 | (80.0) |
| **Driver age (yrs)*** | | | | | | | | | | | | |
| ≤20 | 118 | (5.9) | 1,872 | (94.1) | 1,748 | (27.3) | 4,666 | (72.8) | 170 | (30.8) | 381 | (69.2) |
| 21–29 | 1,052 | (5.0) | 20,149 | (95.0) | 6,674 | (19.8) | 27,069 | (80.2) | 458 | (22.4) | 1,587 | (77.6) |
| 30–39 | 1,423 | (4.4) | 31,238 | (95.6) | 7,803 | (16.4) | 39,832 | (83.6) | 396 | (20.7) | 1,519 | (79.3) |
| 40–49 | 629 | (4.8) | 12,609 | (95.3) | 3,974 | (16.9) | 19,490 | (83.1) | 173 | (17.8) | 797 | (82.2) |
| 50–59 | 212 | (5.7) | 3,520 | (94.3) | 1,812 | (22.4) | 6,267 | (77.6) | 83 | (18.4) | 366 | (81.6) |
| ≥60 | 152 | (5.8) | 2,481 | (94.2) | 1,402 | (25.0) | 4,196 | (75.0) | 50 | (19.2) | 210 | (80.8) |
| **Driver restraint use*** | | | | | | | | | | | | |
| Restrained | 3,527 | (4.7) | 71,010 | (95.3) | 22,905 | (18.6) | 100,253 | (81.4) | 651 | (15.5) | 3,544 | (84.5) |
| Unrestrained | 58 | (6.3) | 859 | (93.7) | 508 | (28.6) | 1,267 | (71.4) | 677 | (34.0) | 1,314 | (66.0) |
| **Driver airbag deployment*** | | | | | | | | | | | | |
| Deployed | 387 | (5.3) | 6,958 | (94.7) | 2,520 | (21.8) | 9,052 | (78.2) | 236 | (23.6) | 763 | (76.4) |
| Not deployed | 3,082 | (4.6) | 63,725 | (95.4) | 20,191 | (18.2) | 90,482 | (81.8) | 1,019 | (20.6) | 3,924 | (79.4) |
| Deployment not applicable | 116 | (8.9) | 1,186 | (91.1) | 702 | (26.1) | 1,985 | (73.9) | 73 | (29.9) | 171 | (70.1) |
| **Driver alcohol/drug use*,†** | | | | | | | | | | | | |
| Suspected | 33 | (7.0) | 433 | (93.0) | 422 | (32.1) | 892 | (67.9) | 139 | (35.9) | 248 | (64.2) |
| Not suspected | 3,039 | (4.8) | 60,883 | (95.3) | 20,692 | (18.8) | 89,220 | (81.2) | 1,044 | (20.4) | 4,070 | (79.6) |
| **Driver distraction*,†** | | | | | | | | | | | | |
| Distracted | 451 | (6.3) | 6,761 | (93.7) | 3,013 | (23.6) | 9,767 | (76.4) | 233 | (26.2) | 657 | (73.8) |
| Not distracted | 2,620 | (4.6) | 54,555 | (95.4) | 18,101 | (18.4) | 80,345 | (81.6) | 949 | (20.6) | 3,661 | (79.4) |
| **Driver injury severity*** | | | | | | | | | | | | |
| Killed | 1 | (1.2) | 66 | (98.8) | 39 | (31.5) | 86 | (68.5) | 15 | (20.4) | 59 | (79.6) |
| Incapacitated | 59 | (6.7) | 813 | (93.3) | 376 | (26.0) | 1,071 | (74.0) | 91 | (27.0) | 246 | (73.0) |
| Not incapacitated | 231 | (7.4) | 2,914 | (92.6) | 1,344 | (23.5) | 4,369 | (76.5) | 191 | (26.2) | 538 | (73.8) |
| Possible injury | 503 | (4.4) | 10,872 | (95.6) | 3,288 | (17.4) | 15,609 | (82.6) | 252 | (18.9) | 1,080 | (81.1) |
| Not injured | 2,786 | (4.7) | 57,074 | (95.4) | 18,341 | (18.6) | 80,243 | (81.4) | 779 | (21.0) | 2,927 | (79.0) |
| Injured, severity unknown | 5 | (4.0) | 130 | (96.0) | 24 | (14.4) | 142 | (85.6) | 0 | (4.4) | 9 | (95.6) |

See table footnotes on next page.

**TABLE 9. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 4–7 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Optimal | | | | Suboptimal | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **3,584** | **(4.8)** | **71,870** | **(95.3)** | **23,413** | **(18.7)** | **101,520** | **(81.3)** | **1,328** | **(21.5)** | **4,858** | **(78.5)** |
| **Driver level of care*** | | | | | | | | | | | | |
| Not treated in hospital | 2,980 | (4.7) | 60,023 | (95.3) | 19,740 | (18.9) | 84,563 | (81.1) | 967 | (22.3) | 3,360 | (77.7) |
| Treated in emergency department | 580 | (4.9) | 11,324 | (95.1) | 3,435 | (17.5) | 16,213 | (82.5) | 298 | (18.8) | 1,287 | (81.2) |
| Hospitalized | 24 | (5.0) | 455 | (95.0) | 197 | (23.3) | 649 | (76.7) | 49 | (24.3) | 151 | (75.7) |
| Died | 1 | (1.2) | 67 | (98.8) | 41 | (30.3) | 94 | (69.7) | 15 | (20.4) | 60 | (79.6) |
| **Speed*,†** | | | | | | | | | | | | |
| Speed related | 161 | (6.1) | 2,478 | (93.9) | 1,013 | (22.1) | 3,571 | (77.9) | 150 | (26.6) | 414 | (73.4) |
| Not speed related | 2,973 | (4.7) | 60,082 | (95.3) | 20,283 | (18.8) | 87,584 | (81.2) | 1,036 | (20.9) | 3,929 | (79.1) |
| **Time of day** | | | | | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 3,394 | (4.8) | 67,569 | (95.2) | 21,467 | (18.7) | 93,380 | (81.3) | 1,172 | (21.7) | 4,230 | (78.3) |
| Night (9:00 p.m.–5:59 a.m.) | 203 | (4.4) | 4,469 | (95.7) | 2,061 | (19.6) | 8,429 | (80.4) | 183 | (21.1) | 685 | (78.9) |
| **Location†** | | | | | | | | | | | | |
| Urban (>5,000 population) | 1,858 | (4.4) | 40,793 | (95.6) | 10,925 | (16.6) | 54,816 | (83.4) | 567 | (17.4) | 2,700 | (82.6) |
| Rural (≤5,000 population) | 497 | (4.9) | 9,638 | (95.1) | 2,752 | (19.2) | 11,573 | (80.8) | 276 | (25.7) | 798 | (74.3) |
| **Initial impact point†** | | | | | | | | | | | | |
| No collision | 28 | (7.4) | 346 | (92.6) | 133 | (20.7) | 510 | (79.3) | 27 | (39.5) | 42 | (60.5) |
| Front | 1,503 | (6.2) | 22,922 | (93.9) | 10,705 | (23.0) | 35,854 | (77.0) | 738 | (28.2) | 1,877 | (71.8) |
| Right | 232 | (5.2) | 4,225 | (94.8) | 1,642 | (20.3) | 6,447 | (79.7) | 107 | (23.9) | 342 | (76.1) |
| Rear | 744 | (4.7) | 15,262 | (95.4) | 4,723 | (17.9) | 21,638 | (82.1) | 140 | (18.5) | 614 | (81.5) |
| Left | 233 | (5.3) | 4,207 | (94.8) | 1,739 | (20.5) | 6,760 | (79.5) | 93 | (22.9) | 314 | (77.1) |
| Other | 97 | (5.0) | 1,859 | (95.0) | 574 | (19.5) | 2,374 | (80.5) | 54 | (25.2) | 160 | (74.8) |
| **First harmful event†** | | | | | | | | | | | | |
| No collision | 62 | (6.8) | 859 | (93.2) | 378 | (22.5) | 1,303 | (77.5) | 71 | (27.5) | 186 | (72.5) |
| Motor vehicle in transport | 2,924 | (4.7) | 59,828 | (95.3) | 19,394 | (18.5) | 85,677 | (81.5) | 840 | (18.8) | 3,623 | (81.2) |
| Nonfixed object | 234 | (4.4) | 5,078 | (95.6) | 1,357 | (17.0) | 6,641 | (83.0) | 96 | (27.5) | 253 | (72.5) |
| Fixed object | 260 | (5.9) | 4,183 | (94.2) | 1,684 | (23.2) | 5,563 | (76.8) | 237 | (28.3) | 602 | (71.7) |
| **Vehicle age†** | | | | | | | | | | | | |
| Before 2002 | 1,440 | (5.6) | 24,228 | (94.4) | 9,294 | (21.2) | 34,655 | (78.9) | 661 | (23.5) | 2,148 | (76.5) |
| 2002 or later | 622 | (3.5) | 17,268 | (96.5) | 3,160 | (14.4) | 18,749 | (85.6) | 115 | (16.2) | 595 | (83.8) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 10. Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 8–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restrained | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **75,483** | **(33.0)** | **153,589** | **(67.1)** | **2,335** | **(28.5)** | **5,867** | **(71.5)** |
| **Driver sex*** | | | | | | | | |
| Male | 26,699 | (31.6) | 57,895 | (68.4) | 1,050 | (27.6) | 2,757 | (72.4) |
| Female | 48,784 | (33.8) | 95,694 | (66.2) | 1,285 | (29.2) | 3,110 | (70.8) |
| **Driver age (yrs)*** | | | | | | | | |
| ≤20 | 6,801 | (42.6) | 9,182 | (57.5) | 402 | (35.2) | 740 | (64.8) |
| 21–29 | 9,791 | (32.2) | 20,599 | (67.8) | 440 | (30.5) | 1,003 | (69.5) |
| 30–39 | 26,693 | (31.3) | 58,671 | (68.7) | 763 | (28.8) | 1,889 | (71.2) |
| 40–49 | 20,936 | (31.5) | 45,510 | (68.5) | 456 | (25.6) | 1,324 | (74.4) |
| 50–59 | 6,674 | (35.6) | 12,067 | (64.4) | 144 | (20.0) | 573 | (80.0) |
| ≥60 | 4,589 | (37.8) | 7,560 | (62.2) | 130 | (27.8) | 337 | (72.2) |
| **Driver restraint use*** | | | | | | | | |
| Restrained | 74,529 | (32.9) | 151,995 | (67.1) | 1,106 | (20.0) | 4,427 | (80.0) |
| Unrestrained | 955 | (37.5) | 1,594 | (62.5) | 1,229 | (46.0) | 1,440 | (54.0) |
| **Driver airbag deployment*** | | | | | | | | |
| Deployed | 7,494 | (36.1) | 13,251 | (63.9) | 481 | (34.8) | 902 | (65.2) |
| Not deployed | 66,138 | (32.4) | 137,709 | (67.6) | 1,744 | (26.8) | 4,759 | (73.2) |
| Deployment not applicable | 1,852 | (41.3) | 2,629 | (58.7) | 110 | (34.7) | 206 | (65.3) |
| **Driver alcohol/drug use*,†** | | | | | | | | |
| Suspected | 886 | (45.0) | 1,084 | (55.0) | 173 | (45.5) | 208 | (54.6) |
| Not suspected | 65,838 | (33.0) | 133,556 | (67.0) | 1,929 | (27.5) | 5,085 | (72.5) |
| **Driver distraction*,†** | | | | | | | | |
| Distracted | 8,492 | (38.2) | 13,722 | (61.8) | 382 | (33.2) | 768 | (66.8) |
| Not distracted | 58,232 | (32.5) | 120,918 | (67.5) | 1,720 | (27.6) | 4,525 | (72.5) |
| **Driver injury severity*** | | | | | | | | |
| Killed | 77 | (39.8) | 116 | (60.2) | 33 | (36.9) | 56 | (63.1) |
| Incapacitated | 962 | (37.7) | 1,587 | (62.3) | 178 | (36.0) | 316 | (64.0) |
| Not incapacitated | 3,724 | (38.1) | 6,063 | (62.0) | 321 | (33.2) | 647 | (66.9) |
| Possible injury | 11,115 | (32.7) | 22,855 | (67.3) | 454 | (28.5) | 1,138 | (71.5) |
| Not injured | 59,517 | (32.7) | 122,743 | (67.4) | 1,348 | (26.7) | 3,698 | (73.3) |
| Injured, severity unknown | 89 | (28.4) | 225 | (71.6) | 1 | (6.2) | 12 | (93.9) |

See table footnotes on next page.

**TABLE 10. (*Continued*) Motor vehicle crash and driver characteristics, by child restraint use and seating position among children aged 8–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | Restrained | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | |
| Characteristic | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| **Total** | **75,483** | **(33.0)** | **153,589** | **(67.1)** | **2,335** | **(28.5)** | **5,867** | **(71.5)** |
| **Driver level of care*** | | | | | | | | |
| Not treated in hospital | 63,366 | (32.8) | 129,737 | (67.2) | 1,653 | (27.9) | 4,266 | (72.1) |
| Treated in emergency department | 11,479 | (33.5) | 22,753 | (66.5) | 546 | (28.7) | 1,353 | (71.3) |
| Hospitalized | 561 | (36.4) | 983 | (63.7) | 103 | (35.3) | 189 | (64.7) |
| Died | 77 | (39.8) | 117 | (60.2) | 33 | (36.4) | 58 | (63.6) |
| **Speed*,†** | | | | | | | | |
| Speed related | 3,007 | (35.1) | 5,560 | (64.9) | 251 | (33.0) | 511 | (67.0) |
| Not speed related | 64,506 | (32.9) | 131,404 | (67.1) | 1,862 | (27.9) | 4,821 | (72.1) |
| **Time of day** | | | | | | | | |
| Day (6:00 a.m.–8:59 p.m.) | 69,617 | (33.3) | 139,724 | (66.7) | 2,050 | (29.2) | 4,974 | (70.8) |
| Night (9:00 p.m.–5:59 a.m.) | 6,131 | (30.0) | 14,328 | (70.0) | 311 | (24.9) | 940 | (75.1) |
| **Location†** | | | | | | | | |
| Urban (>5,000 population) | 38,733 | (31.5) | 84,323 | (68.5) | 969 | (23.9) | 3,079 | (76.1) |
| Rural (≤5,000 population) | 9,522 | (31.8) | 20,464 | (68.3) | 531 | (34.1) | 1,025 | (65.9) |
| **Initial impact point†** | | | | | | | | |
| No collision | 440 | (35.9) | 786 | (64.1) | 19 | (24.5) | 58 | (75.5) |
| Front | 29,636 | (37.5) | 49,406 | (62.5) | 1,237 | (37.7) | 2,045 | (62.3) |
| Right | 4,984 | (35.6) | 9,032 | (64.4) | 181 | (30.5) | 414 | (69.5) |
| Rear | 15,711 | (32.3) | 32,989 | (67.7) | 285 | (28.2) | 724 | (71.8) |
| Left | 5,010 | (34.5) | 9,510 | (65.5) | 159 | (28.3) | 402 | (71.7) |
| Other | 1,764 | (32.7) | 3,636 | (67.3) | 104 | (33.6) | 206 | (66.5) |
| **First harmful event†** | | | | | | | | |
| No collision | 1,010 | (33.4) | 2,011 | (66.6) | 118 | (31.6) | 255 | (68.4) |
| Motor vehicle in transport | 62,910 | (33.1) | 127,430 | (67.0) | 1,551 | (26.8) | 4,230 | (73.2) |
| Nonfixed object | 4,955 | (30.2) | 11,429 | (69.8) | 108 | (21.6) | 392 | (78.4) |
| Fixed object | 4,772 | (36.1) | 8,435 | (63.9) | 360 | (33.5) | 714 | (66.5) |
| **Vehicle age†** | | | | | | | | |
| Before 2002 | 28,011 | (34.9) | 52,322 | (65.1) | 1,186 | (32.5) | 2,464 | (67.5) |
| 2002 or later | 13,638 | (28.9) | 33,495 | (71.1) | 246 | (22.2) | 860 | (77.8) |

* A total of 2,025 children did not have driver data included in their record.
† Certain states did not collect this variable.

**TABLE 11. Rank and percentage of most common body regions injured* in motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| Rank and age group | Restraint use (%) | | | | | | Seating position (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| **Ages 1–3 yrs** | | | | | | | | | | |
| 1 | Head/Face/Neck | 3.2 | Head/Face/Neck | 2.9 | Head/Face/Neck | 9.0 | Head/Face/Neck | 3.7 | Head/Face/Neck | 3.3 |
| 2 | Extremity | 1.3 | Extremity | 1.3 | Extremity | 4.0 | Extremity | 1.7 | Extremity | 1.3 |
| 3 | Torso | 0.5 | Torso | 0.6 | Torso | 1.6 | Torso | 0.8 | Torso | 0.5 |
| 4 | Other | 0.4 | Other | 0.6 | TBI | 1.6 | Other | 0.6 | Other | 0.5 |
| 5 | Vertebral column | 0.2 | Vertebral column | 0.3 | Other | 1.4 | TBI | 0.4 | TBI | 0.2 |
| 6 | TBI | 0.2 | TBI | 0.2 | Vertebral column | 0.5 | Vertebral column | 0.3 | Vertebral column | 0.2 |
| 7 | Systemwide | 0.2 | Systemwide | 0.1 | Systemwide | 0.3 | Systemwide | 0.2 | Systemwide | 0.2 |
| 8 | Spinal column | 0.01 | Spinal column | 0.01 | Spinal column | 0.1 | Spinal column | 0.03 | Spinal column | 0.01 |
| **Ages 4–7 yrs** | | | | | | | | | | |
| 1 | Head/Face/Neck | 3.5 | Head/Face/Neck | 3.9 | Head/Face/Neck | 12.9 | Head/Face/Neck | 5.3 | Head/Face/Neck | 3.9 |
| 2 | Extremity | 1.8 | Extremity | 2.4 | Extremity | 7.3 | Extremity | 2.9 | Extremity | 2.3 |
| 3 | Torso | 0.9 | Torso | 1.3 | Torso | 3.8 | Torso | 1.7 | Torso | 1.2 |
| 4 | Vertebral column | 0.7 | Vertebral column | 0.9 | TBI | 2.2 | Vertebral column | 1.0 | Vertebral column | 0.8 |
| 5 | Other | 0.5 | Other | 0.6 | Other | 2.2 | Other | 0.8 | Other | 0.6 |
| 6 | TBI | 0.2 | TBI | 0.3 | Vertebral column | 1.5 | TBI | 0.5 | TBI | 0.3 |
| 7 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.3 | Systemwide | 0.1 | Systemwide | 0.1 |
| 8 | Spinal column | 0 | Spinal column | 0.01 | Spinal column | 0.02 | Spinal column | 0.01 | Spinal column | 0.01 |
| **Ages 8–12 yrs** | **Restrained** | | | | **Unrestrained** | | **Front** | | **Back** | |
| 1 | Extremity | | 3.8 | | Extremity | 11.7 | Extremity | 4.7 | Extremity | 3.9 |
| 2 | Head/Face/Neck | | 3.3 | | Head/Face/Neck | 11.2 | Head/Face/Neck | 3.9 | Head/Face/Neck | 3.5 |
| 3 | Torso | | 1.8 | | Torso | 4.0 | Torso | 2.2 | Torso | 1.8 |
| 4 | Vertebral column | | 1.8 | | Vertebral column | 3.4 | Vertebral column | 2.1 | Vertebral column | 1.8 |
| 5 | Other | | 0.7 | | TBI | 2.6 | Other | 0.8 | Other | 0.7 |
| 6 | TBI | | 0.3 | | Other | 2.0 | TBI | 0.4 | TBI | 0.4 |
| 7 | Systemwide | | 0.1 | | Systemwide | 0.2 | Systemwide | 0.1 | Systemwide | 0.1 |
| 8 | Spinal column | | 0 | | Spinal column | 0 | Spinal column | 0 | Spinal column | 0 |

**Abbreviation:** TBI = traumatic brain injury.

* Body region categories are derived from *International Classification of Diseases, 9th Revision, Clinical Modification* codes and are based on the Barell matrix (available at http://www.cdc.gov/nchs/data/ice/final_matrix_post_ice.pdf).

**TABLE 12. Rank and percentage of most common body regions* injured in motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| Rank and age group | Restrained (%) | | | | | | | | Unrestrained (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | | | Suboptimal | | | | | | | |
| | Front | | Back | | Front | | Back | | Front | | Back | |
| **Ages 1–3 yrs** | | | | | | | | | | | | |
| 1 | Head/Face/Neck | 3.6 | Head/Face/Neck | 3.2 | Head/Face/Neck | 2.7 | Head/Face/Neck | 3.1 | Head/Face/Neck | 11.2 | Head/Face/Neck | 8.5 |
| 2 | Extremity | 1.4 | Extremity | 1.3 | Extremity | 1.5 | Extremity | 1.3 | Extremity | 5.6 | Extremity | 3.4 |
| 3 | Torso | 0.6 | Torso | 0.5 | Torso | 0.8 | Other | 0.6 | Other | 1.8 | TBI | 1.6 |
| 4 | Other | 0.4 | Other | 0.4 | Other | 0.6 | Torso | 0.6 | Torso | 1.7 | Torso | 1.6 |
| 5 | TBI | 0.3 | Vertebral column | 0.2 | Vertebral column | 0.4 | Vertebral column | 0.3 | TBI | 1.4 | Other | 1.3 |
| 6 | Vertebral column | 0.2 | TBI | 0.2 | TBI | 0.4 | TBI | 0.2 | Vertebral column | 0.7 | Vertebral column | 0.4 |
| 7 | Systemwide | 0.2 | Systemwide | 0.2 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.5 | Systemwide | 0.3 |
| 8 | Spinal column | 0 | Spinal column | 0.01 | Spinal column | 0 | Spinal column | 0.01 | Spinal column | 0.4 | Spinal column | 0.03 |
| **Ages 4–7 yrs** | | | | | | | | | | | | |
| 1 | Head/Face/Neck | 4.1 | Head/Face/Neck | 3.5 | Head/Face/Neck | 4.7 | Head/Face/Neck | 3.8 | Head/Face/Neck | 17.9 | Head/Face/Neck | 11.7 |
| 2 | Extremity | 1.9 | Extremity | 1.8 | Extremity | 2.7 | Extremity | 2.4 | Extremity | 9.3 | Extremity | 6.9 |
| 3 | Torso | 0.9 | Torso | 0.9 | Torso | 1.6 | Torso | 1.3 | Torso | 4.7 | Torso | 3.6 |
| 4 | Vertebral column | 0.7 | Vertebral column | 0.7 | Vertebral column | 1 | Vertebral column | 0.9 | TBI | 2.9 | TBI | 2.1 |
| 5 | Other | 0.5 | Other | 0.5 | Other | 0.7 | Other | 0.6 | Other | 2.4 | Other | 2.0 |
| 6 | TBI | 0.1 | TBI | 0.2 | TBI | 0.4 | TBI | 0.3 | Vertebral column | 1.2 | Vertebral column | 1.6 |
| 7 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.2 | Systemwide | 0.3 |
| 8 | Spinal column | 0 | Spinal column | 0 | Spinal column | 0.01 | Spinal column | 0.01 | Spinal column | 0.1 | Spinal column | 0.01 |

| Ages 8–12 yrs | Restrained | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | |
| 1 | Extremity | 4.4 | Extremity | 3.6 | Head/Face/Neck | 14.4 | Extremity | 10.7 |
| 2 | Head/Face/Neck | 3.6 | Head/Face/Neck | 3.2 | Extremity | 14.1 | Head/Face/Neck | 10.2 |
| 3 | Torso | 2.1 | Torso | 1.7 | Torso | 4.7 | Torso | 3.6 |
| 4 | Vertebral column | 2.0 | Vertebral column | 1.7 | Vertebral column | 4.3 | Vertebral column | 3.3 |
| 5 | Other | 0.7 | Other | 0.6 | TBI | 3.1 | TBI | 2.4 |
| 6 | TBI | 0.4 | TBI | 0.3 | Other | 1.9 | Other | 2.0 |
| 7 | Systemwide | 0.1 | Systemwide | 0.1 | Systemwide | 0.2 | Systemwide | 0.2 |
| 8 | Spinal column | 0 | Spinal column | 0 | Spinal column | 0.01 | Spinal column | 0 |

**Abbreviation:** TBI = traumatic brain injury.

* Body region categories are derived from *International Classification of Diseases, 9th Revision, Clinical Modification* codes and are based on the Barell matrix (available at http://www.cdc.gov/nchs/data/ice/final_matrix_post_ice.pdf).

**TABLE 13. Rank and percentage of most common types of injuries in motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| Rank and age group | Restraint use (%) | | | | | | Seating position (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | Suboptimal | | Unrestrained | | Front | | Back | |
| **Ages 1–3 yrs** | | | | | | | | | | |
| 1 | Contusion/Superficial | 3.0 | Contusion/Superficial | 2.7 | Contusion/Superficial | 7.8 | Contusion/Superficial | 3.6 | Contusion/Superficial | 3.1 |
| 2 | Open wounds | 1.0 | Open wounds | 1.0 | Open wounds | 2.9 | Open wounds | 1.2 | Open wounds | 1.1 |
| 3 | Sprains and strains | 0.4 | Sprains and strains | 0.6 | Internal | 1.7 | Sprains and strains | 0.6 | Sprains and strains | 0.5 |
| 4 | Fracture | 0.3 | Fracture | 0.3 | Fracture | 1.6 | Fracture | 0.6 | Fracture | 0.3 |
| 5 | Internal | 0.2 | Internal | 0.3 | Sprains and strains | 0.9 | Internal | 0.4 | Internal | 0.2 |
| **Ages 4–7 yrs** | | | | | | | | | | |
| 1 | Contusion/Superficial | 3.7 | Contusion/Superficial | 4.5 | Contusion/Superficial | 12.7 | Contusion/Superficial | 5.8 | Contusion/Superficial | 4.3 |
| 2 | Open wounds | 1.2 | Sprains and strains | 1.5 | Open wounds | 5.4 | Open wounds | 1.6 | Open wounds | 1.4 |
| 3 | Sprains and strains | 1.1 | Open wounds | 1.3 | Fracture | 2.7 | Sprains and strains | 1.5 | Sprains and strains | 1.3 |
| 4 | Fracture | 0.5 | Fracture | 0.6 | Internal | 2.4 | Fracture | 0.9 | Fracture | 0.5 |
| 5 | Internal | 0.2 | Internal | 0.3 | Sprains and strains | 2.3 | Internal | 0.5 | Internal | 0.3 |
| **Ages 8–12 yrs** | Restrained | | | | Unrestrained | | Front | | Back | |
| 1 | Contusion/Superficial | | 4.9 | | Contusion/Superficial | 13.1 | Contusion/Superficial | 5.9 | Contusion/Superficial | 4.9 |
| 2 | Sprains and strains | | 3.0 | | Open wounds | 5.1 | Sprains and strains | 3.4 | Sprains and strains | 2.9 |
| 3 | Open wounds | | 1.0 | | Sprains and strains | 4.2 | Open wounds | 1.2 | Open wounds | 1.2 |
| 4 | Fracture | | 0.7 | | Fracture | 3.2 | Fracture | 0.9 | Fracture | 0.8 |
| 5 | Internal | | 0.4 | | Internal | 2.6 | Internal | 0.5 | Internal | 0.4 |

**TABLE 14. Rank and percentage of most common types of injuries from motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| Rank and age group | Restrained (%) | | | | | | | | Unrestrained (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | | | Suboptimal | | | | | | | |
| | Front | | Back | | Front | | Back | | Front | | Back | |
| **Ages 1–3 yrs** | | | | | | | | | | | | |
| 1 | Contusion/ superficial | 3.5 | Contusion/ superficial | 3.0 | Contusion/ superficial | 2.8 | Contusion/ superficial | 2.7 | Contusion/ superficial | 10.3 | Contusion/ superficial | 7.1 |
| 2 | Open wounds | 1.2 | Open wounds | 1.0 | Sprains and strains | 0.8 | Open wounds | 1.1 | Open wounds | 3.8 | Open wounds | 2.7 |
| 3 | Fracture | 0.4 | Sprains and strains | 0.4 | Open wounds | 0.8 | Sprains and strains | 0.6 | Fracture | 2.7 | Internal | 1.7 |
| 4 | Sprains and strains | 0.4 | Fracture | 0.3 | Internal | 0.4 | Fracture | 0.3 | Internal | 2.1 | Fracture | 1.3 |
| 5 | Internal | 0.2 | Internal | 0.2 | Fracture | 0.4 | Internal | 0.2 | Sprains and strains | 1.0 | Sprains and strains | 0.8 |
| **Ages 4–7 yrs** | | | | | | | | | | | | |
| 1 | Contusion/ superficial | 4.1 | Contusion/ superficial | 3.7 | Contusion/ superficial | 5.4 | Contusion/ superficial | 4.3 | Contusion/ superficial | 17.2 | Contusion/ superficial | 11.6 |
| 2 | Open wounds | 1.3 | Open wounds | 1.2 | Sprains and strains | 1.6 | Sprains and strains | 1.5 | Open wounds | 6.3 | Open wounds | 5.2 |
| 3 | Sprains and strains | 1.1 | Sprains and strains | 1.1 | Open wounds | 1.4 | Open wounds | 1.3 | Fracture | 3.8 | Fracture | 2.5 |
| 4 | Fracture | 0.5 | Fracture | 0.4 | Fracture | 0.8 | Fracture | 0.5 | Internal | 3.4 | Sprains and strains | 2.5 |
| 5 | Internal | 0.1 | Internal | 0.2 | Internal | 0.4 | Internal | 0.3 | Sprains and strains | 1.7 | Internal | 2.2 |

| Ages 8–12 yrs | Restrained | | | | Unrestrained | | | |
|---|---|---|---|---|---|---|---|---|
| | Front | | Back | | Front | | Back | |
| 1 | Contusion/superficial | 5.6 | Contusion/superficial | 4.6 | Contusion/ Superficial | 16.3 | Contusion/ superficial | 12.1 |
| 2 | Sprains and strains | 3.3 | Sprains and strains | 2.8 | Sprains and strains | 5.6 | Sprains and strains | 5.2 |
| 3 | Open wounds | 1.0 | Open wounds | 1.0 | Open wounds | 5.1 | Open wounds | 4.7 |
| 4 | Fracture | 0.8 | Fracture | 0.7 | Fracture | 4.8 | Fracture | 2.9 |
| 5 | Internal | 0.4 | Internal | 0.3 | Internal | 3.2 | Internal | 2.4 |

**TABLE 15. Frequency of neck, back, or abdominal injuries; traumatic brain injuries; and hospitalizations from motor vehicle crashes, by restraint use, seating position, and age group among children aged 1—12 years — Crash Outcome Data Evaluation System, 11 states, 2005—2008**

| | | Received this injury | | | | Received this injury | | |
|---|---|---|---|---|---|---|---|---|
| Type of injury and age group | Restraint use | No | Yes | Total | Seating position | No | Yes | Total |
| **Neck, back, or abdominal injury** | | | | | | | | |
| Ages 1–3 yrs | Unrestrained | 3,809 | 279 | 4,088 | — | — | — | — |
| | Suboptimal | 30,564 | 796 | **31,360** | Front | 12,325 | 407 | **12,733** |
| | Optimal | 141,925 | 3,807 | **145,732** | Back | 163,972 | 4,475 | **168,447** |
| | **Total** | **176,298** | **4,882** | **181,180** | **Total** | **176,298** | **4,882** | **181,180** |
| Ages 4–7 yrs | Unrestrained | 5,530 | 739 | 6,269 | — | — | — | — |
| | Suboptimal | 119,777 | 5,559 | **125,336** | Front | 26,872 | 1,608 | **28,480** |
| | Optimal | 72,940 | 2,696 | **75,636** | Back | 171,374 | 7,386 | **178,761** |
| | **Total** | **198,247** | **8,994** | **207,241** | **Total** | **198,247** | **8,994** | **207,241** |
| Ages 8–12 yrs | Unrestrained | 7,254 | 1,021 | 8,275 | Front | 73,294 | 4,815 | 78,110 |
| | Restrained | 217,681 | 12,118 | **229,800** | Back | 151,641 | 8,324 | **159,965** |
| | **Total** | **224,935** | **13,140** | **238,075** | **Total** | **224,935** | **13,140** | **238,075** |
| **Total** | **—** | **1,198,959** | **54,031** | **1,252,992** | — | **1,198,959** | **54,031** | **1,252,992** |
| **Traumatic brain injury** | | | | | | | | |
| Ages 1–3 yrs | Unrestrained | 4,024 | 64 | 4,088 | — | — | — | — |
| | Suboptimal | 31,284 | 76 | **31,360** | Front | 12,686 | 47 | **12,733** |
| | Optimal | 145,423 | 309 | **145,732** | Back | 168,044 | 403 | **168,447** |
| | **Total** | **180,730** | **449** | **181,180** | **Total** | **180,730** | **449** | **181,180** |
| Ages 4–7 yrs | Unrestrained | 6,125 | 144 | 6,269 | — | — | — | — |
| | Suboptimal | 124,973 | 363 | **125,336** | Front | 28,351 | 129 | **28,480** |
| | Optimal | 75,462 | 173 | **75,636** | Back | 178,209 | 552 | **178,761** |
| | **Total** | **206,560** | **680** | **207,241** | **Total** | **206,560** | **680** | **207,241** |
| Ages 8–12 yrs | Unrestrained | 8,063 | 212 | 8,275 | Front | 77,775 | 334 | 78,110 |
| | Restrained | 229,097 | 703 | **229,800** | Back | 159,385 | 581 | **159,965** |
| | **Total** | **237,160** | **915** | **238,075** | **Total** | **237,160** | **915** | **238,075** |
| **Total** | **—** | **1,248,901** | **4,088** | **1,252,992** | — | **1,248,900** | **4,090** | **1,252,992** |
| **Hospitalized** | | | | | | | | |
| Ages 1–3 yrs | Unrestrained | 3,351 | 737 | 4,088 | — | — | — | — |
| | Suboptimal | 28,996 | 2,364 | **31,360** | Front | 11,703 | 1,030 | **12,733** |
| | Optimal | 133,632 | 12,100 | **145,732** | Back | 154,276 | 14,171 | **168,447** |
| | **Total** | **165,979** | **15,200** | **181,180** | **Total** | **165,979** | **15,200** | **181,180** |
| Ages 4–7 yrs | Unrestrained | 4,701 | 1,568 | 6,269 | — | — | — | — |
| | Suboptimal | 112,831 | 12,505 | **125,336** | Front | 25,296 | 3,184 | **28,480** |
| | Optimal | 68,844 | 6,791 | **75,636** | Back | 161,080 | 17,680 | **178,761** |
| | **Total** | **186,376** | **20,864** | **207,241** | **Total** | **186,376** | **20,864** | **207,241** |
| Ages 8–12 yrs | Unrestrained | 6,100 | 2,176 | 8,275 | Front | 68,677 | 9,432 | 78,110 |
| | Restrained | 204,853 | 24,946 | **229,800** | Back | 142,276 | 17,690 | **159,965** |
| | **Total** | **210,953** | **27,122** | **238,075** | **Total** | **210,953** | **27,122** | **238,075** |
| **Total** | — | **1,126,617** | **126,374** | **1,252,992** | — | **1,126,616** | **126,373** | **1,252,992** |

**TABLE 16. Odds ratios of neck, back, or abdominal injuries; traumatic brain injuries; and hospitalizations from motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| Age group and type of injury | Restraint use and seating position* | Odds ratio | 95% CI |
|---|---|---|---|
| **Ages 1–3 yrs** | | | |
| Neck, back, or abdominal injury | Optimal versus unrestrained | 0.37 | 0.32–0.41 |
| | Optimal versus suboptimal | 1.03 | 0.95–1.11 |
| | Suboptimal versus unrestrained | 0.36 | 0.31–0.41 |
| | Back versus front | 0.83 | 0.75–0.92 |
| Traumatic brain injury | Optimal versus unrestrained | 0.13 | 0.10–0.17 |
| | Optimal versus suboptimal | 0.87 | 0.68–1.12 |
| | Suboptimal versus unrestrained | 0.15 | 0.11–0.21 |
| | Back versus front | 0.65 | 0.48–0.88 |
| Hospitalized | Optimal versus unrestrained | 0.41 | 0.38–0.45 |
| | Optimal versus suboptimal | 1.11 | 1.06–1.16 |
| | Suboptimal versus unrestrained | 0.37 | 0.34–0.41 |
| | Back versus front | 1.04 | 0.98–1.12 |
| **Ages 4–7 yrs** | | | |
| Neck, back, or abdominal injury | Optimal versus unrestrained | 0.28 | 0.25–0.3 |
| | Optimal versus suboptimal | 0.81 | 0.77–0.84 |
| | Suboptimal versus unrestrained | 0.35 | 0.32–0.38 |
| | Back versus front | 0.72 | 0.68–0.76 |
| Traumatic brain injury | Optimal versus unrestrained | 0.10 | 0.08–0.12 |
| | Optimal versus suboptimal | 0.79 | 0.66–0.95 |
| | Suboptimal versus unrestrained | 0.12 | 0.10–0.15 |
| | Back versus front | 0.68 | 0.56–0.83 |
| Hospitalized | Optimal versus unrestrained | 0.30 | 0.28–0.31 |
| | Optimal versus suboptimal | 0.89 | 0.86–0.92 |
| | Suboptimal versus unrestrained | 0.33 | 0.31–0.35 |
| | Back versus front | 0.87 | 0.84–0.91 |
| **Ages 8–12 yrs** | | | |
| Neck, back, or abdominal injury | Restrained versus unrestrained | 0.40 | 0.37–0.42 |
| | Back versus front | 0.84 | 0.81–0.87 |
| | Restrained back versus restrained front | 0.84 | 0.81–0.87 |
| Traumatic brain injury | Restrained versus unrestrained | 0.12 | 0.10–0.14 |
| | Back versus front | 0.85 | 0.74–0.97 |
| | Restrained back versus restrained front | 0.83 | 0.71–0.97 |
| Hospitalized | Restrained versus unrestrained | 0.34 | 0.32–0.36 |
| | Back versus front | 0.91 | 0.88–0.93 |
| | Restrained back versus restrained front | 0.90 | 0.87–0.92 |

* Restraint use: restrained (subcategorized as optimal or suboptimal for children aged 1–7 years) or unrestrained; seating position: back or front.

**TABLE 17. Median hospital charges (in 2008 dollars) for injuries from motor vehicle crashes, by outcome, restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | | Charges | | | | |
|---|---|---|---|---|---|---|
| | | Restraint use | | | Seating position | |
| Age group and outcome | No. | Optimal | Suboptimal | Unrestrained | Front | Back |
| **Ages 1–3 yrs** | | **(N = 12,071)** | **(N = 2,362)** | **(N = 713)** | **(N = 1,023)** | **(N = 14,122)** |
| **Total** | **15,145** | **$310.00** | **$382.64** | **$539.00** | **$427.00** | **$320.00** |
| Treated in emergency department | 14,575 | $297.06 | $358.57 | $425.00 | $391.00 | $310.00 |
| Hospital admission | 478 | $11,124.19 | $12,836.00 | $17,184.00 | $13,696.00 | $12,507.65 |
| Outpatient | 38 | $3,135.00 | $10,085.75 | $7,664.00 | $7,664.00 | $4,583.00 |
| Died | 54 | $5,137.00 | $2,035.25 | $2,868.00 | $3,615.00 | $4,465.50 |
| **Ages 4–7 yrs** | | **(N = 6,780)** | **(N = 12,492)** | **(N = 1,544)** | **(N = 3,190)** | **(N = 17,626)** |
| **Total** | **20,816** | **$369.18** | **$422.15** | **$619.00** | **$472.32** | **$404.94** |
| Treated in emergency department | 19,912 | $355.00 | $402.28 | $500.00 | $435.00 | $386.00 |
| Hospital admission | 772 | $12,573.04 | $12,434.50 | $16,254.00 | $13,919.25 | $13,111.00 |
| Outpatient | 78 | $3,757.50 | $3,738.59 | $8,025.00 | $6,431.00 | $3,616.00 |
| Died | 54 | $4,176.00 | $8,693.00 | $2,798.58 | $5,745.79 | $4,176.00 |
| | | Restraint use | | | Seating position | |
| | | Restrained | | Unrestrained | Front | Back |
| **Ages 8–12 yrs** | | **(N = 24,963)** | | **(N = 2,135)** | **(N = 9,435)** | **(N = 17,663)** |
| **Total** | **27,098** | **$509.78** | | **$765.00** | **$538.25** | **$516.61** |
| Treated in emergency department | 25,998 | $491.00 | | $649.56 | $510.00 | $494.00 |
| Hospital admission | 946 | $13,760.00 | | $18,149.00 | $14,540.74 | $14,733.70 |
| Outpatient | 108 | $4,145.00 | | $4,072.00 | $4,413.00 | $3,384.00 |
| Died | 46 | $9,518.29 | | $3,105.00 | $4,792.00 | $7,260.00 |

**TABLE 18. Median hospital charges (in 2008 dollars) for injuries from motor vehicle crashes, by outcome, restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | | Charges | | | | | |
|---|---|---|---|---|---|---|---|
| | | Restrained | | | | | |
| | | Optimal | | Suboptimal | | Unrestrained | |
| Age group and outcome | No. | Front | Back | Front | Back | Front | Back |
| **Ages 1–3 yrs** | | **(N = 490)** | **(N = 11,580)** | **(N = 384)** | **(N = 1,978)** | **(N = 149)** | **(N = 564)** |
| **Total** | **15,145** | **$331.96** | **$308.60** | **$484.69** | **$367.00** | **$791.00** | **$497.52** |
| Treated in emergency department | 14,575 | $312.87 | $296.00 | $446.93 | $350.90 | $509.00 | $414.00 |
| Hospital admission | 478 | $14,795.25 | $10,963.00 | $13,277.00 | $12,836.00 | $12,195.50 | $18,282.35 |
| Outpatient | 38 | $3,640.00 | $3,114.00 | $12,048.00 | $9,771.00 | $7,664.00 | $8,955.00 |
| Died | 54 | $6,933.37 | $5,137.00 | $2,035.25 | $2,776.91 | $4,556.50 | $2,245.17 |
| **Ages 4–7 yrs** | | **(N = 333)** | **(N = 6,447)** | **(N = 2,486)** | **(N = 10,006)** | **(N = 371)** | **(N = 1,173)** |
| **Total** | **20,816** | **$351.00** | **$369.98** | **$469.00** | **$413.00** | **$823.15** | **$596.00** |
| Treated in emergency department | 19,912 | $338.84 | $356.00 | $439.00 | $395.00 | $642.00 | $482.00 |
| Hospital admission | 772 | $12,615.20 | $12,573.04 | $13,210.34 | $12,298.98 | $20,047.50 | $15,816.08 |
| Outpatient | 78 | $8,235.00 | $3,757.50 | $4,285.00 | $3,127.00 | $8,528.00 | $8,320.00 |
| Died | 54 | NA | $4,176.00 | $5,517.95 | $7,575.71 | $26,412.79 | $1,679.00 |
| | | Restrained | | | | Unrestrained | |
| | | Front | | Back | | Front | Back |
| **Ages 8–12 yrs** | | **(N = 8,763)** | | **(N = 16,199)** | | **(N = 671)** | **(N = 1,464)** |
| **Total** | **27,098** | **$522.67** | | **$501.00** | | **$913.00** | **$715.00** |
| Treated in emergency department | 25,998 | $500.40 | | $484.00 | | $706.00 | $619.64 |
| Hospital admission | 946 | $13,878.83 | | $13,760.00 | | $16,744.00 | $19,166.00 |
| Outpatient | 108 | $4,413.00 | | $3,737.00 | | $4,559.00 | $3,121.85 |
| Died | 46 | $4,597.50 | | $9,518.29 | | $7,185.50 | $2,145.00 |

**TABLE 19. 90th percentile hospital charges (in 2008 dollars) for injuries from motor vehicle crashes, by outcome, restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | | Charges | | | | |
|---|---|---|---|---|---|---|
| | | Restraint use | | | Seating position | |
| Age group and outcome | No. | Optimal | Suboptimal | Unrestrained | Front | Back |
| **Ages 1–3 yrs** | | **(N = 12,071)** | **(N = 2,362)** | **(N = 713)** | **(N = 1,023)** | **(N = 14,122)** |
| **Total** | **15,145** | **$1,380.00** | **$1,975.60** | **$9,674.80** | **$4,119.15** | **$1,519.00** |
| Treated in emergency department | 14,575 | $1,080.00 | $1,304.32 | $3,346.44 | $1,795.00 | $1,144.25 |
| Hospital admission | 478 | $43,138.00 | $66,842.75 | $56,734.00 | $37,936.94 | $54,778.37 |
| Outpatient | 38 | $8,794.00 | $13,990.75 | $12,649.57 | $12,048.00 | $11,376.00 |
| Died | 54 | $48,614.35 | $17,367.58 | $35,358.00 | $16,094.00 | $53,223.68 |
| **Ages 4–7 yrs** | | **(N = 6,780)** | **(N = 12,492)** | **(N = 1,544)** | **(N = 3,190)** | **(N = 17,626)** |
| **Total** | **20,816** | **$1,648.50** | **$2,381.00** | **$10,388.00** | **$4,402.00** | **$2,158.00** |
| Treated in emergency department | 19,912 | $1,291.00 | $1,570.12 | $3,801.21 | $2,515.00 | $1,467.90 |
| Hospital admission | 772 | $60,126.00 | $49,507.75 | $50,595.54 | $42,350.00 | $55,521.94 |
| Outpatient | 78 | $8,235.00 | $15,127.25 | $12,504.00 | $15,268.00 | $11,433.00 |
| Died | 54 | $84,421.73 | $34,484.70 | $50,027.00 | $59,405.00 | $53,716.00 |
| | | Restraint use | | | Seating position | |
| | | Restrained | | Unrestrained | Front | Back |
| **Ages 8–12 yrs** | | **(N = 24,963)** | | **(N = 2,135)** | **(N = 9,435)** | **(N = 17,663)** |
| **Total** | **27,098** | **$2,361.00** | | **$10,260.00** | **$2,912.09** | **$2,566.00** |
| Treated in emergency department | 25,998 | $1,779.68 | | $3,522.00 | $2,031.50 | $1,795.40 |
| Hospital admission | 946 | $50,790.00 | | $61,333.00 | $49,886.00 | $54,136.00 |
| Outpatient | 108 | $11,351.00 | | $11,764.00 | $11,351.00 | $11,764.00 |
| Died | 46 | $113,177.00 | | $61,523.00 | $69,231.00 | $109,072.70 |

**TABLE 20. 90th percentile hospital charges (in 2008 dollars) for injuries from motor vehicle crashes, by restraint use, seating position, and age group among children aged 1–12 years — Crash Outcome Data Evaluation System, 11 states, 2005–2008**

| | | Charges | | | | | |
|---|---|---|---|---|---|---|---|
| | | Restrained | | | | | |
| | | Optimal | | Suboptimal | | Unrestrained | |
| Age group and outcome | No. | Front | Back | Front | Back | Front | Back |
| **Ages 1–3 yrs** | | **(N = 490)** | **(N = 11,580)** | **(N = 384)** | **(N = 1,978)** | **(N = 149)** | **(N = 564)** |
| **Total** | **15,145** | **$2,412.00** | **$1,335.89** | **$3,125.00** | **$1,766.15** | **$11,708.50** | **$9,431.55** |
| Treated in emergency department | 14,575 | $1,420.00 | $1,071.00 | $1,916.00 | $1,219.00 | $3,802.00 | $3,246.00 |
| Hospital admission | 478 | $37,489.00 | $43,737.68 | $37,145.30 | $66,842.75 | $43,657.00 | $75,243.40 |
| Outpatient | 38 | $3,640.00 | $8,794.00 | $12,048.00 | $13,990.75 | $12,649.57 | $13,283.25 |
| Died | 54 | $6,985.78 | $85,619.00 | $2,035.25 | $30,159.15 | $16,094.00 | $57,833.00 |
| **Ages 4–7 yrs** | | **(N = 333)** | **(N = 6,447)** | **(N = 2,486)** | **(N = 10,006)** | **(N = 371)** | **(N = 1,173)** |
| **Total** | **20,816** | **$1,958.00** | **$1,630.00** | **$3,696.00** | **$2,035.91** | **$11,143.85** | **$9,956.60** |
| Treated in emergency department | 19,912 | $1,620.00 | $1,286.00 | $2,119.00 | $1,452.00 | $5,055.00 | $3,432.00 |
| Hospital admission | 772 | $60,126.00 | $59,668.50 | $42,350.00 | $52,964.15 | $35,889.00 | $53,410.00 |
| Outpatient | 78 | $9,618.00 | $7,730.00 | $16,904.00 | $11,109.75 | $12,504.00 | $13,404.00 |
| Died | 54 | NA | $84,421.73 | $28,710.00 | $53,716.00 | $59,405.00 | $29,804.86 |
| | | Restrained | | | | Unrestrained | |
| | | Front | | Back | | Front | Back |
| **Ages 8–12 yrs** | | **(N = 8,763)** | | **(N = 16,199)** | | **(N = 671)** | **(N = 1,464)** |
| **Total** | **27,098** | **$2,546.00** | | **$2,256.00** | | **$10,820.10** | **$8,922.30** |
| Treated in emergency department | 25,998 | $1,885.42 | | $1,704.00 | | $4,154.00 | $2,935.00 |
| Hospital admission | 946 | $49,358.30 | | $52,327.00 | | $52,410.70 | $63,591.60 |
| Outpatient | 108 | $11,347.00 | | $11,460.75 | | $11,431.00 | $14,509.00 |
| Died | 46 | $72,006.00 | | $192,802.68 | | $61,523.00 | $24,137.00 |

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