INDIANA CHILD PASSENGER SAFETY FACTS

January 2008

The mission of the Automotive Safety Program at Riley Hospital for Children, Indiana University School of Medicine is to reduce injuries and fatalities resulting from motor vehicle crashes in Indiana. The Automotive Safety Program was founded in 1981 by Dr. Marilyn Bull. Funded by the Governor's Council on Impaired & Dangerous Driving, the program directs child passenger safety research, education, and training in the state of Indiana. To assist in these efforts, the Indiana University Center for Urban Policy and the Environment is partnering with the Automotive Safety Program to analyze Indiana child restraint survey data to identify trends in Indiana child passenger safety and child restraint usage since 2001.

AUTOMOTIVE SAFETY PROGRAM
At Riley Hospital for Children, Indiana University School of Medicine

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CENTER FOR URBAN POLICY AND THE ENVIRONMENT

INDIANA CHILD RESTRAINT SURVEY 2001 - 2006

AGES 0-15

Motor vehicle crashes are the leading cause of death in the United States for children between the ages of two and 14.[1] In Indiana, over 4,400 child injuries occurred in motor vehicle collisions in 2006, 45 of which were fatal.[2] This report summarizes data trends during the period 2001 to 2006 in the areas of child restraint device usage, child passenger seating positions, and driver awareness of recommended child passenger safety standards and legislation. Findings are based on Indiana child restraint survey data (for 2001, 2003, 2005 and 2006) conducted by the Automotive Safety Program, Riley Hospital for Children and the Indiana University School of Medicine, Division of Biostatistics.

Indiana Child Restraint Survey Methodology and Sampling Strategy

Since 1998, the Automotive Safety Program (ASP) at Riley Hospital for Children has commissioned field surveys of child safety seat usage patterns conducted at various sites across the state of Indiana by certified child safety technicians. Survey databases were then created and maintained by the Indiana University School of Medicine, Division of Biostatistics. Surveys were administered in 1998, 2001, 2003, 2005, 2006, and 2007.

While sampling strategies varied slightly for each survey year, statisticians continually considered county population estimates to identify counties as urban or rural. A random sample of both urban and rural counties was then selected. Child safety technicians selected random sites within the sample counties, with the number of sites in urban counties exceeding the number of sites in rural counties.[3] The 1998 survey was not included in this trend analysis due to variations in instrument design that would have hindered time series comparisons.

Typically, the surveys consist of two parts—an observational evaluation of each child passenger within a selected vehicle and a survey with a set of questions completed by the driver. The child safety seat survey generally covers driver and occupant position, occupant age, gender, weight, child restraint device type used, and manner of usage. In conjunction with the child safety seat survey, vehicle type, age, and airbag information is also collected. The driver survey instrument typically includes questions about participants' demographic attributes, perception and awareness of current regulations and best practices regarding restraint usage, and the various means and resources drivers access in learning how to use child restraint devices.

[1]National Center for Statistics and Analysis, National Highway Traffic Safety Administration, *Traffic Safety Facts: Children (2006 data).*

[2]Indiana University Center for Urban Policy and the Environment, *Indiana Traffic Safety Facts: Children (2006 data)*, D. Sapp, M. Nagle, May 2007.

[3]Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

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CHILD RESTRAINT USAGE

Child Restraint Laws and Best Practices

According to the National Highway Traffic Safety Administration (NHTSA), "child safety seats reduce the risk of fatal injury by 71 percent for infants and by 54 percent for toddlers in passenger cars."[4] NHTSA research also shows that proper usage of lap/shoulder seat belts greatly reduces the risk of fatal injury to child occupants age 5 and older. Nationally, in 2005, 53 percent of children (0 to 14 years old) who were fatally injured in a traffic accident were unrestrained.[5]

The current Indiana child passenger restraint law requires all child occupants (ages 15 and younger) to be properly restrained in a child restraint device (CRD) or seat belt in all seating positions in all vehicles. A detailed description and history of Indiana child passenger restraint laws and regulations is provided in Text Box 1.

In addition to legislative efforts, child passenger safety experts have developed further recommended safety standards and best practices. NHTSA advocates that child occupants graduate through four phases of restraint usage from birth to adulthood (Figure 1). The Automotive Safety Program has incorporated these steps into their recommended best practices in child passenger safety. These guidelines include the use of rear facing child safety seats as long as possible, to the weight or height limit of the seat; at a minimum, until a child is a year old and at least 20 pounds. These guidelines also include the use of belt positioning booster seats (BPBs) for children who have outgrown child safety seats with harnesses.

Text Box 1: Indiana Child Passenger Restraint Laws and Regulations

Legislative History of Indiana Child Passenger Restraint Regulations

- January 1, 1984: Children in a motor vehicle who were four years or younger required to be restrained; aged two or younger required to be in a child restraint and aged three or four required to be in a child restraint or seat belt.
- July 1, 1998: Children from birth up to age four required to be in some type of child restraint. Children from age four to 12 required to be in child restraints or seat belts.
  (Both the 1984 and 1998 laws applied anywhere in a motor vehicle; primary enforcement. There are two types of restraint laws, primary and secondary. Primary (standard) restraint laws allow a law enforcement officer to stop a vehicle and issue a citation when the officer observes an unrestrained driver or passenger. Secondary enforcement means that a citation for being unrestrained can only be written after the officer stops the vehicle or cites the offender for another infraction.)
- July 1, 2005: Indiana Child Restraint Law
  - Children are required to ride properly restrained in a child restraint, which can include a belt positioning booster seat, until they reach their 8th birthday. (This does not include shoulder belt positioners.)
  - Children at least 8 years old until their 16th birthday are required to ride properly restrained in a child restraint system or seat belt in all seating positions in all vehicles; primary enforcement.
  - If all lap/shoulder seat belts are being used by other children, then a child over 40 pounds may ride in a lap only seat belt without a child restraint. (Booster seats cannot be safely used with a lap only seat belt.)
    (*Passenger Restraint Systems for Children*, IC 9-19-11; available at http://www.in.gov/legislative/ic/code/title9/ar19/ch11.html)

(Above summary text regarding the 2005 Indiana Child Restraint Law was excerpted from Automotive Safety Program, Riley Hospital for Children website on November 19, 2007, http://www.preventinjury.org/GIRestraintLaws.asp)

Legislative History of Indiana Seat Belt Law

- July 1, 1987: Occupants five years of age or older required to be restrained in a safety belt. This law applied to the front seat only; secondary enforcement with vehicles plated as trucks considered exempt. In 1998, the law was changed to apply primary enforcement, with vehicles plates as trucks exempt.
- July 1, 2007: All occupants of a motor vehicle 16 and older required to be restrained with seat belts; legislation applies to any seating position in vehicle and includes vehicles plated as trucks.
  (*Passenger Restraint Systems*, IC 9-19-10-2; available at http://www.ai.org/legislative/ic/code/title9/ar19/ch10.html)

Source: Automotive Safety Program, Riley Hospital for Children, November 8, 2007

[4]National Center for Statistics and Analysis, National Highway Traffic Safety Administration, *Traffic Safety Facts: Children (2006 data)*.

[5]National Center for Statistics and Analysis, National Highway Traffic Safety Administration (February 2007), *Traffic Safety Facts: Strengthening Child Passenger Safety Laws.*

Figure 1: NHTSA's Four Steps for Kids

GROWING UP SAFE: It's a four-step process. As children grow, how they sit in your car, truck or SUV should change. Save your child from injury or death by observing all four steps.

Note: All children under 13 should ride in the back seat. Always read the child restraint instructions and the vehicle owner's manual.

Source: http://www.boosterseat.gov/4StepsFlyer.pdf

Child Restraint Device Types

Child restraint survey results show improvements in CRD usage since the current Indiana child restraint law was enacted in July 2005. Table 1 depicts the percentage of child occupants utilizing specified CRD types by age group between 2001 and 2006. While both infant only seats and convertible (rear facing) CRDs are appropriate for child passengers under one year old, the percentage of child occupants in the < *1 year old* age group that were restrained in

Table 1: The Percentage of Child Occupants Utilizing Specified Child Restraint Device (CRD) Type by Age Group (2001 to 2006)

	2001								2003							
CRD Type	< 1 year old		1 to 3 years old		4 to 7 years old		8 to 15 years old		< 1 year old		1 to 3 years old		4 to 7 years old		8
	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	C
Infant only seat	31	62.0	7	3.5	0	0.0	0	0.0	24	64.9	1	0.6	0	0.0	
Convertible	15	30.0	88	44.2	3	2.5	1	1.6	12	32.4	69	43.7	4	2.3	
Integrated seat	1	2.0	1	0.5	0	0.0	0	0.0	0	0.0	7	4.4	0	0.0	
Combination w/harness	0	0.0	30	15.1	2	1.7	2	3.2	1	2.7	40	25.3	8	4.6	
Forward facing only	2	4.0	21	10.6	4	3.4	0	0.0	0	0.0	4	2.5	1	0.6	
Shield booster	0	0.0	14	7.0	8	6.7	1	1.6	0	0.0	4	2.5	3	1.7	
Highback BPB*	0	0.0	14	7.0	18	15.1	0	0.0	0	0.0	12	7.6	11	6.4	
Backless BPB	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0	3	1.9	17	9.8	
Lap belt	0	0.0	6	3.0	11	9.2	4	6.3	0	0.0	4	2.5	29	16.8	
Shoulder belt	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Lap/shoulder belt	0	0.0	11	5.5	55	46.2	47	74.6	0	0.0	9	5.7	86	49.7	
On lap	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0	0	0.0	2	1.2	
None	0	0.0	7	3.5	18	15.1	8	12.7	0	0.0	5	3.2	11	6.4	
Other	1	2.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	
Total	**50**	**100.0**	**199**	**100.0**	**119**	**100.0**	**63**	**100.0**	**37**	**100.0**	**158**	**100.0**	**173**	**100.0**	

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

***Due to the fact that the highback BPB and backless BPB categories for 2001 were combined into one category, the highback BPB numbers for 2001 represent those cases repor**

****Percentage totals are calculated as the percentage of all child occupants in a particular age group that utilized the specified child restraint device.**

***** 'n/a' (not applicable) indicates that category was not included in the survey year depicted.**

******Percentage totals may not add up to 100 due to rounding.**

*******Age groups are defined as the beginning age in any given category up to the beginning age of the next category (e.g., the 1 to 3 years old age group includes all child pass**

an infant only car seat increased from 62 percent in 2001 to over 93 percent in 2006. During this same period, the percentage of child passengers in this age group that were restrained in a convertible CRD, decreased from 30 percent in 2001 to less than 5 percent in 2006, indicating a shift from convertible CRDs to infant only seats. The percentage of child passengers under one year old restrained in either an infant only seat or a convertible CRD increased from 92 percent in 2001 to about 98 percent in 2006. This represents nearly a 6 percent increase in child passengers under one year old who were restrained by an appropriate CRD type.

Likewise, the percentage of child occupants in the *4 to 7 year old* age group restrained by a backless BPB increased from just under 10 percent in 2003 to more than 42 percent in 2006 (backless BPB usage was not reported in 2001), indicating a shift to this type of CRD. The percentage of *4 to 7 year olds* restrained in a highback BPB increased from over 6 percent in 2003 to 17 percent in 2006, peaking at just over 24 percent in 2005 (highback BPB numbers were not reported in 2001). The overall percentage of child passengers restrained by some type of BPB (including both highback and backless BPBs) increased dramatically during this period, from about 15 percent in 2001 to nearly 60 percent in 2006. The percentage of BPB usage for 2006, however, represents a decline from 2005, with a reported rate of more than 66 percent.

Lap/shoulder belt usage among *8 to 15 year olds* also increased during this period, while the percentage of child occupants wearing no restraints decreased across all age groups. The *8 to 15 year old* age group, which historically has been more likely to be unrestrained in a vehicle, saw a decrease in the percentage of child occupants wearing no restraint from over 12 percent in 2001 to less than 3 percent in 2006. These numbers seem to indicate improved awareness and adherence to the Indiana child passenger restraint law and the Automotive Safety Program recommended best practices.

Child Occupant Seating Positions

The federal Centers for Disease Control and Prevention reports that children less than 16 years old, riding in the back seat, are 40 percent less likely to be seriously injured in traffic collisions.[6] Current child passenger safety best practices urge all child occupants less than 13 years old to ride in the rear seat of passenger vehicles (Figure 1). NHTSA reports that

[6]Centers for Disease Control and Prevention, Department of Health and Human Services, *Child Passenger Safety: Fact Sheet*, extracted from website, November 19, 2007, http://www.cdc.gov/ncipc/factsheets/childpas.htm

[7]National Center for Statistics and Analysis, National Highway Traffic Safety Administration, *Traffic Safety Facts: Children (2006 data).*

		2005								2006							
to 15 years old		< 1 year old		1 to 3 years old		4 to 7 years old		8 to 15 years old		< 1 year old		1 to 3 years old		4 to 7 years old		8 to 15 years old	
Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**	Count	%**
0	0.0	28	90.3	26	10.2	1	0.4	0	0.0	42	93.3	26	6.5	0	0.0	0	0.0
1	0.7	1	3.2	123	48.4	6	2.6	0	0.0	2	4.4	167	41.9	17	5.3	0	0.0
0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	3	0.8	2	0.6	0	0.0
0	0.0	1	3.2	57	22.4	9	3.9	0	0.0	1	2.2	115	28.8	30	9.3	1	0.3
0	0.0	0	0.0	11	4.3	1	0.4	0	0.0	0	0.0	20	5.0	3	0.9	0	0.0
0	0.0	0	0.0	1	0.4	4	1.8	1	0.4	0	0.0	3	0.8	2	0.6	0	0.0
0	0.0	0	0.0	15	5.9	55	24.1	3	1.1	0	0.0	37	9.3	55	17.1	5	1.4
1	0.7	1	3.2	14	5.5	96	42.1	12	4.5	0	0.0	19	4.8	136	42.2	14	3.8
14	9.5	0	0.0	1	0.4	7	3.1	19	7.1	0	0.0	1	0.3	9	2.8	25	6.8
n/a	n/a	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	2	0.5
117	79.1	0	0.0	3	1.2	39	17.1	211	79.3	0	0.0	6	1.5	57	17.7	309	84.2
2	1.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0	0	0.0	0	0.0	1	0.3
13	8.8	0	0.0	2	0.8	10	4.4	19	7.1	0	0.0	2	0.5	10	3.1	10	2.7
0	0.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0	0	0.0	1	0.3	0	0.0
148	**100.0**	**31**	**100.0**	**254**	**100.0**	**228**	**100.0**	**266**	**100.0**	**45**	**100.0**	**399**	**100.0**	**322**	**100.0**	**367**	**100.0**

rted as 'belt positioning booster'.

engers reported as ages 1, 2, or 3 years old).

"children age 12 and under are safest when properly buckled in the back seat of a motor vehicle" away from front passenger-side air bags.[7]

As depicted in Figure 2, child restraint survey results show a downward trend across all age groups in the percentage of child occupants seated in the front seat. The percentage of *1 to 3 year olds* seated in the front right passenger position decreased from 7 percent in 2001 to less than 2 percent in 2006, while the portion of *8 to 15 year olds* seated in this position dropped 18 percentage points during this same period. Most dramatically, the percentage of *4 to 7 year olds* seated in the front right passenger position decreased from nearly 22 percent in 2001 to less than 6 percent in 2006. Again, this appears to be reflective of increased best practice public awareness efforts that occurred in 2005.

Table 2: Where did you learn to install your car seat(s)? (Check all that apply)

	2001		2003		2005		2006	
	Count	%	Count	%	Count	%	Count	%
Car seat instruction manual/instructions on side of car seat*	243	79.7	253	82.4	389	82.6	551	78.2
Friend/family member or relative*	73	23.9	70	22.8	109	23.1	184	26.1
Doctor/prenatal class*	57	18.7	42	13.7	52	11.0	113	16.0
Certified child passenger safety technician/permanent fitting station/car seat clinic*	35	11.5	35	11.4	36	7.6	43	6.1
Vehicle manual	25	8.2	43	14.0	54	11.5	69	9.8
Media (internet/TV, radio, newspaper)*	n/a	n/a	n/a	n/a	1	0.2	18	2.6
Other	29	9.5	22	7.2	48	10.2	66	9.4
Total Respondents**	**305**		**307**		**471**		**705**	

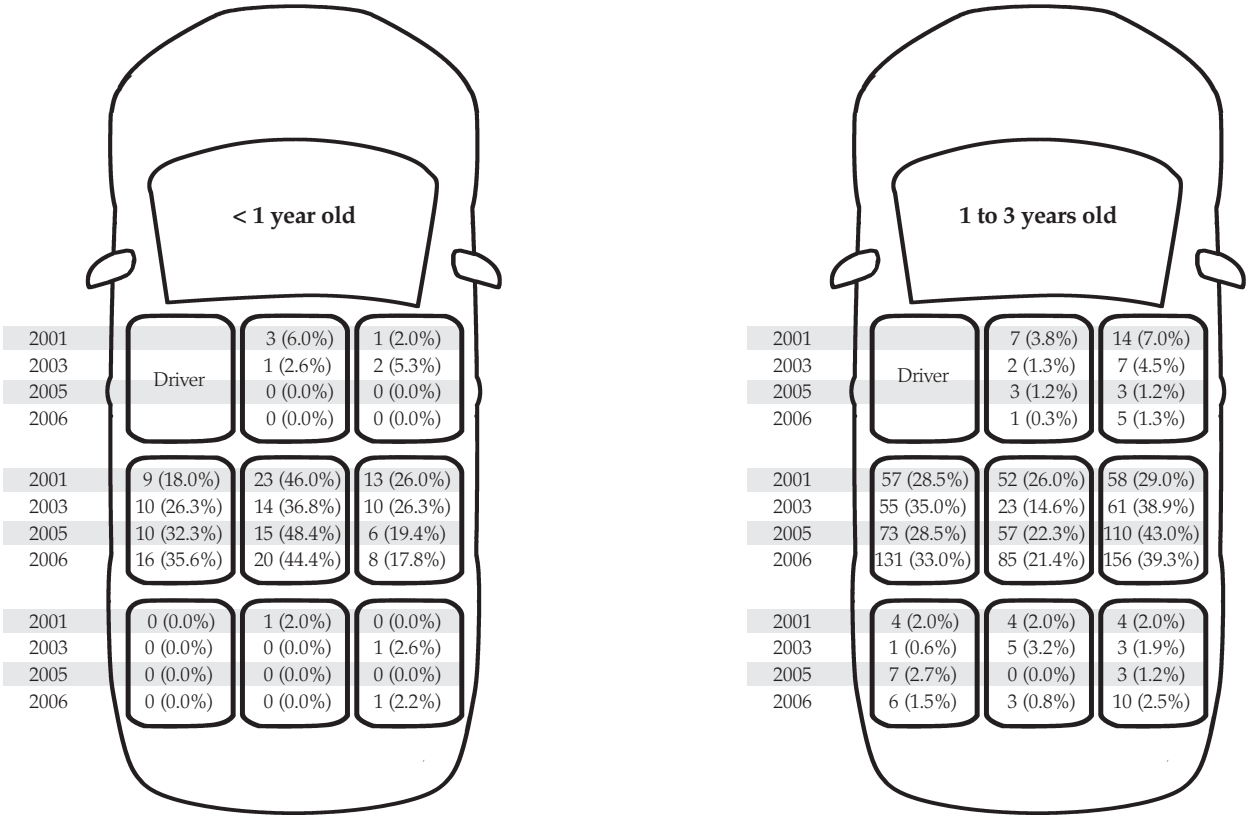
Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

*** This table and subsequent analysis regarding this question include combined categories to allow for more meaningful analysis and effective presentation of results. The "car seat instruction manual" and "instructions on the side of the car seat" are considered similar and thus are combined. Responses related to informal consultation with friends and/or family members or relatives are also collapsed into one group. Modes that involve child passenger safety trained personnel are combined under "certified child passenger safety technician/permanent fitting station or car seat clinic." Similarly, "doctor" and "prenatal class" categories are grouped together as both are related to healthcare. The "internet" and "TV, radio, newspaper" options were added to the 2005 and 2006 surveys and are classified as media.**

**** Due to the fact that this survey question allowed for multiple responses, percentages do not total 100. Percentages are calculated based on the total number of respondents that answered this question.**

Figure 2: Vehicle Occupant Seating Position by Age Group and Year



Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

***Percentage totals may not add up to 100 due to rounding.**
****Age groups are defined as the beginning age in any given category up to the beginning age of the next category (e.g., the 1 to 3 years old age group includes all child passeng**

DRIVER AWARENESS

Car Seat Installation

Across all four years of survey data, the primary means by which a substantial majority of survey participants reported learning to install their car seats was by consulting either the car seat manual and/or instructions on the side of the car seat. Table 2 shows that consistently over time, approximately 80 percent of respondents reported using car seat specific materials. This method was followed by roughly one-quarter of respondents that indicated either friends and/or family members assisted them with this task. The share of responses associated with learning from a doctor and/or prenatal class varied from a high of nearly 19 percent in 2001 to 11 percent in 2005. Use of a vehicle manual did not exceed 15 percent in any given year and fluctuated only slightly over time. Over the four years of survey data, the use of trained and certified personnel and/or venues where such qualified individuals were available appears to have fallen, from 12 percent in 2001

Table 3: Where did you learn to install your car seat(s)? (Check all that a

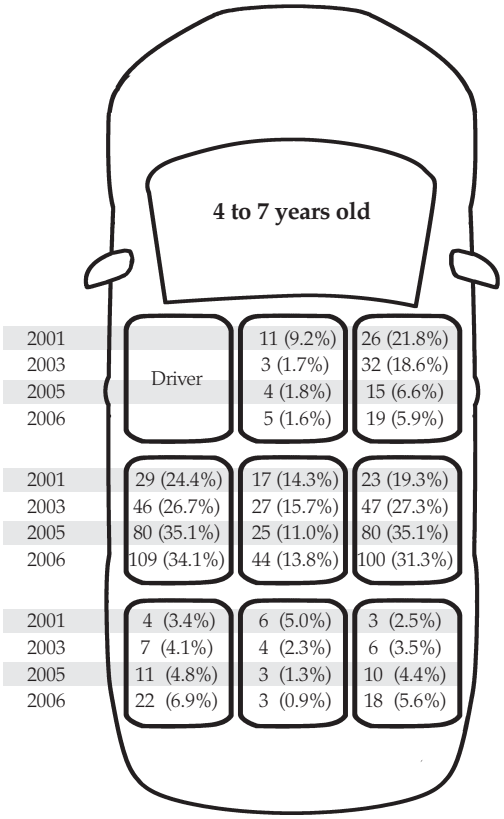
	2003					
	Less than high school		High school graduate		Some college/ trade school	
	Count	%	Count	%	Count	%
Car seat instruction manual/ instructions on side of car seat	6	46.2	91	74.6	85	86.7
Friend/family member or relative	5	38.5	24	19.7	30	30.6
Doctor/prenatal class	0	0.0	15	12.3	16	16.3
Certified child passenger safety technician	0	0.0	10	8.2	14	14.3
Vehicle manual	1	7.7	17	13.9	14	14.3
Media (internet/TV, radio, newspaper)	n/a	n/a	n/a	n/a	n/a	n/a
Other	2	15.4	13	10.7	5	5.1
Total respondents**	**13**		**122**		**98**	

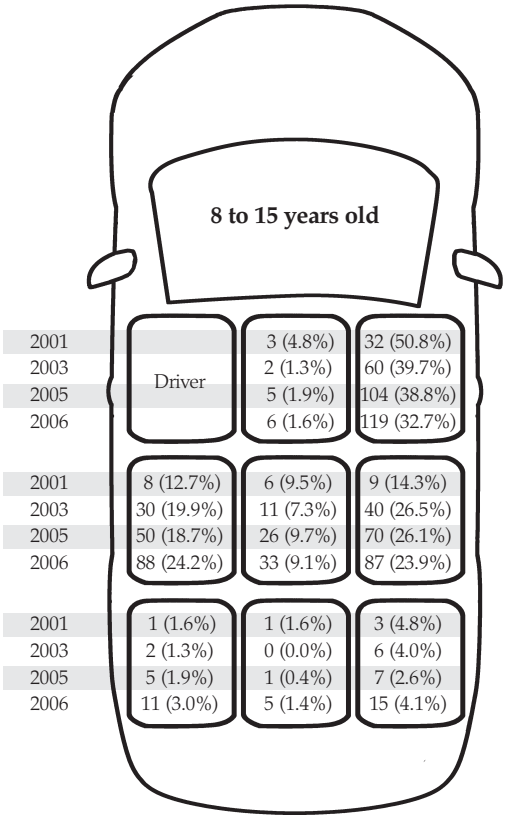
Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for

Note: Percentage totals may not add up to 100 due to rounding.

*** The 2001 survey question regarding education combined "college" and "trade school" into o taining to education are not included.**

**** Due to the fact that this survey question allowed for multiple responses, percentages do no**





gers reported as ages 1, 2, or 3 years old).

pply), by Educational Attainment

		2005								2006							
College graduate		Less than high school		High school graduate		Some college/ trade school		College graduate		Less than high school		High school graduate		Some college/ trade school		College graduate	
Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
63	96.9	20	71.4	138	75.4	121	89.0	101	91.0	17	50.0	170	70.8	161	75.2	181	93.8
9	13.8	8	28.6	49	26.8	30	22.1	21	18.9	15	44.1	72	30.0	50	23.4	36	18.7
10	15.4	5	17.9	15	8.2	17	12.5	13	11.7	4	11.8	38	15.8	39	18.2	29	15.0
8	12.3	4	14.3	7	3.8	15	11.0	9	8.1	0	0.0	12	5.0	13	6.1	14	7.3
10	15.4	1	3.6	17	9.3	17	12.5	19	17.1	0	0.0	17	7.1	25	11.7	21	10.9
n/a	n/a	0	0.0	0	0.0	1	0.7	0	0.0	3	8.8	7	2.9	6	2.8	2	1.0
2	3.1	3	10.7	18	9.8	9	6.6	15	13.5	7	20.6	19	7.9	23	10.7	16	8.3
65		**28**		**183**		**136**		**111**		**34**		**240**		**214**		**193**	

Children and Indiana University School of Medicine, Division of Biostatistics

ne possible response. Due to this variation from subsequent surveys and to allow for more meaningful analysis and comparison of time series data, the 2001 survey data per-

t total 100. Percentages are calculated based on the total number of respondents that answered this question.

and 2003 to roughly 8 and 6 percent in 2005 and 2006, respectively.

Respondents with higher levels of education were more likely to consult car seat manuals or instructions on car seats. As shown in Table 3, across all three years of data analyzed, nearly 90 percent or more (96 percent in 2003) of college graduates cited the latter. Roughly 70 percent of high school graduates and over three-quarters of respondents who had some college or attended trade school reported using car seat materials. Over time, those with less than a high school education appear to increasingly use such resources: from 38 percent in 2003 to 69 and 50 percent in 2005 and 2006, respectively.

Respondents with lower educational attributes apparently acquire this information from friends and/or family members. In 2006, 44 percent of those with less than a high school education cited using friends or family members compared with 19 percent of college graduates. The media appears to have gained in use, regardless of education grouping. In 2005, when the option was first offered, less than one percent cited the internet compared with 2006 results where nine percent of those with less than a high school education specified the media. Among those with less than a high school education, acquiring this information from a doctor or prenatal class appears to have increased, from none reporting such means in 2003, to 17 and 12 percent in 2005 and 2006, respectively.

The majority of survey respondents across all four income categories were most likely to consult car seat materials regarding installation. However, as Table 4 illustrates, those with annual household incomes of more than $35,000 appear more

Table 4: Where did you learn to install your car seat(s)? (Check all that a

	2003					
	Less than $20,000		$20,000 - $34,999		$35,000 - $49,999	
	Count	%	Count	%	Count	%
Car seat instruction manual/ instructions on side of car seat	46	63.0	59	86.8	57	91.9
Friend/family member or relative	16	21.9	17	25.0	15	24.2
Doctor/prenatal class	12	16.4	7	10.3	4	6.5
Certified child passenger safety technician	9	12.3	5	7.4	7	11.3
Vehicle manual	9	12.3	11	16.2	5	8.1
Media (internet/TV, radio, newspaper)	n/a	n/a	n/a	n/a	n/a	n/a
Other	8	11.0	2	2.9	3	4.8
Total respondents**	**73**		**68**		**62**	

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for

Note: Percentage totals may not add up to 100 due to rounding.

***The 2001 driver survey did not include a question regarding annual household income.**

**** Due to the fact that this survey question allowed for multiple responses, percentages are ca**

Table 5: Where did you learn to install your car seat(s)? (Check all that apply), by Age Group*

	2001										2003							
	16-24		25-34		35-44		45-54		55 or older		16-24		25-34		35-44		45-54	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Car seat instruction manual/ instructions on side of car seat	47	72.3	119	89.5	50	80.6	14	70.0	10	50.0	23	60.5	117	90.0	74	92.5	21	87.5
Friend/family member or relative	22	33.8	23	17.3	11	17.7	9	45.0	8	40.0	13	34.2	26	20.0	16	20.0	8	33.3
Doctor/prenatal class	20	30.8	26	19.5	8	12.9	3	15.0	0	0.0	6	15.8	23	17.7	12	15.0	0	0.0
Certified child passenger safety technician	6	9.2	20	15.0	7	11.3	2	10.0	0	0.0	3	7.9	17	13.1	10	12.5	3	12.5
Vehicle manual	4	6.2	8	6.0	7	11.3	4	20.0	2	10.0	4	10.5	13	10.0	11	13.8	4	16.7
Media (internet/TV, radio, newspaper)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Other	8	12.3	9	6.8	5	8.1	5	25.0	2	10.0	5	13.2	9	6.9	4	5.0	1	4.2
Total respondents**	**65**		**133**		**62**		**20**		**20**		**38**		**130**		**80**		**24**	

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

***For analytical purposes, survey participant ages are collapsed into five categories.**

****Due to the fact that this survey question allowed for multiple responses, percentages do not total 100. Percentages are calculated based on the total number of respondents**

pply), by Annual Household Income*

		2005								2006							
More than $50,000		Less than $20,000		$20,000 - $34,999		$35,000 - $49,999		More than $50,000		Less than $20,000		$20,000 - $34,999		$35,000 - $49,999		More than $50,000	
Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
88	90.7	77	79.4	67	68.4	107	89.2	131	90.3	83	66.4	113	73.9	142	80.7	204	85.7
21	21.6	32	33.0	27	27.6	29	24.2	17	11.7	42	33.6	50	32.7	45	25.6	44	18.5
19	19.6	16	16.5	11	11.2	10	8.3	14	9.7	23	18.4	23	15.0	20	11.4	45	18.9
14	14.4	5	5.2	10	10.2	7	5.8	14	9.7	4	3.2	9	5.9	14	8.0	14	5.9
16	16.5	7	7.2	13	13.3	7	5.8	26	17.9	3	2.4	11	7.2	16	9.1	38	16.0
n/a	n/a	0	0.0	1	1.0	0	0.0	0	0.0	3	2.4	6	3.9	3	1.7	5	2.1
7	7.2	9	9.3	13	13.3	13	10.8	13	9.0	16	12.8	12	7.8	17	9.7	19	8.0
97		**97**		**98**		**120**		**145**		**125**		**153**		**176**		**238**	

Children and Indiana University School of Medicine, Division of Biostatistics

lculated based on the total number of respondents that answered this question.

apt to do so, with over 80 percent in 2003, 2005 and 2006 identifying these resources. In all income groups, with the exception of the *more than $50,000* category in 2005 and 2006, the category of friends and/or family members was the second most commonly reported method for obtaining installation information.

Given the overall reported dominance of car seat material usage, followed by consulting friends and family members, and doctors and/or prenatal classes, these three categories also topped the list among nearly all age groups. Table 5 demonstrates that, over time, the vast majority of respondents—between 80 and over 90 percent—in age clusters *25 to 34* and *35 to 44* tend to consult car seat manuals and/or

		2005										2006									
55 or older		16-24		25-34		35-44		45-54		55 or older		16-24		25-34		35-44		45-54		55 or older	
Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
17	56.7	59	90.8	152	83.5	132	89.8	31	67.4	13	46.4	72	69.9	248	84.9	144	80.9	51	68.9	36	63.2
6	20.0	24	36.9	32	17.6	30	20.4	11	23.9	9	32.1	36	35.0	63	21.6	37	20.8	22	29.7	26	45.6
1	3.3	11	16.9	23	12.6	15	10.2	2	4.3	0	0.0	20	19.4	50	17.1	29	16.3	13	17.6	1	1.8
2	6.7	3	4.6	18	9.9	10	6.8	5	10.9	0	0.0	6	5.8	24	8.2	10	5.6	2	2.7	1	1.8
10	33.3	4	6.2	19	10.4	22	15.0	4	8.7	3	10.7	5	4.9	27	9.2	21	11.8	12	16.2	4	7.0
0	0.0	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	3	2.9	6	2.1	4	2.2	5	6.8	0	0.0
2	6.7	7	10.8	19	10.4	13	8.8	4	8.7	5	17.9	10	9.7	32	11.0	18	10.1	5	6.8	1	1.8
30		**65**		**182**		**147**		**46**		**28**		**103**		**292**		**178**		**74**		**57**	

that answered this question.

Table 6: When is it recommended to turn a child from a rear facing position to a forward facing position?

	2001		2003		2005		2006	
	Count	%	Count	%	Count	%	Count	%
When the child's feet touch the back of the seat	13	4.5	16	5.1	16	3.4	15	2.1
When the child outgrows the rear facing height or weight limit of a convertible car seat (usually about 30-35 pounds)	n/a	n/a	n/a	n/a	112	23.8	178	25.5
When the child gets too fussy	n/a	n/a	1	0.3	n/a	n/a	n/a	n/a
When the child can sit up on his/her own	28	9.6	23	7.3	12	2.6	21	3.0
When the child can eat solid food	1	0.3	1	0.3	n/a	n/a	n/a	n/a
When the child is at least one year old and at least 20 pounds	140	48.1	133	42.4	145	30.9	263	37.7
When the child is at least one year old	n/a	n/a	21	6.7	39	8.3	62	8.9
When the child is two years old	20	6.9	n/a	n/a	n/a	n/a	n/a	n/a
When the child is 20 pounds	48	16.5	62	19.7	31	6.6	68	9.7
Not sure/Don't know	41	14.1	57	18.2	115	24.5	91	13.0
Total respondents	**291**	**100.0**	**314**	**100.0**	**470**	**100.0**	**698**	**100.0**

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

Table 7: Reported Means by Which Survey Participants Learned About Best Practices Regarding Child Safety Seat Position and Transitioning Children to Booster Seats and Seat Belts, (2006)

	How did you learn when it was time to turn a child from a rear facing position to a forward facing position?		How did you learn when it was time to switch a child from a toddler seat to a booser seat?		How did you learn when it was time to switch a child from a booster seat to a seat belt?	
	Count	%	Count	%	Count	%
Car seat instruction manual/instructions on side of car seat	377	53.8	285	40.7	150	21.4
Friend/family member or relative	183	26.1	217	31.0	186	26.6
Doctor/prenatal class	277	39.5	163	23.3	101	14.4
Certified child passenger safety technician	34	4.9	39	5.6	30	4.3
Vehicle manual	21	3.0	21	3.0	15	2.1
Media (internet/TV, radio, newspaper)	50	7.1	94	13.4	171	24.4
Other	62	8.8	60	8.6	73	10.4
Total Respondents**	**701**		**700**		**700**	

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

**** Due to the fact that this survey question allowed for multiple responses, percentages do not total 100. Percentages are calculated based on the total number of respondents that answered this question.**

instructions on restraint devices. Those least likely to identify these resources are *55 or older*—from a low of 46 percent in 2005 to a high of 63 percent in 2006. Those who reported that doctors and/or prenatal classes had assisted them tend to fall within what are considered the child-bearing and/or child-rearing age brackets of *16 to24, 25 to 34,* and *35 to 44 years old*.

Driver Knowledge of Recommended Conditions to Turn a Child from Rear Facing to Forward Facing Position

The American Academy of Pediatrics recommends that children ride rear facing until they are at least one year of age and weigh at least 20 pounds, and remain rear facing in a convertible child safety seat until they have reached the maximum weight or height allowed by the manufacturer.[8] As shown in Table 6, driver awareness of these conditions appears to have increased over time. In 2001, 48 percent of respondents correctly identified *when a child is at least one year and at least 20 pounds*. In 2005 and 2006, driver knowledge increased to 55 and 63 percent respectively, when the latter response was combined with the additional condition of *when a child outgrows the rear facing height or weight limit of a convertible car seat.* The share of respondents that specified conditions that did not correspond with best practices declined from 37 percent and 40 percent in 2001 and 2003 to 20 percent and 24 percent in 2005 and 2006. However, the percentage of respondents that indicated they were unaware of recommended conditions has fluctuated over time, from a low of 13 percent in 2006 to a high of 25 percent in 2005.

The 2006 survey included a question about the means by which drivers learned about best practices regarding when to turn a child from a rear to forward facing position. As shown in Table 7, the majority (54 percent) of respondents reported using the car seat manual and/or consulting instructions on the side of the car seat. Nearly 40 percent identified doctors and/or prenatal classes as their source of this information. Roughly 7 percent cited the media as the means by which they learned. Few (5 percent) reported learning this information from a certified child passenger technician. With regards to switching a child from a toddler to a booster seat, most respondents (41 percent) indicated they learned this information from car seat specific materi-

Table 8: Number and Percentage of Driver Survey Participants that Identified Recommended Conditions for Turning a Child from a Rear to Forward Facing Position, by Income, Education, and Age

	2003			2005			2006		
Annual Household Income*	**Count**	**%**	**Total Respondents*** **	**Count**	**%**	**Total Respondents*** **	**Count**	**%**	**Total Respondents*** **
Less than $20,000	30	41.1	73	47	50.5	93	75	61.0	123
$20,000 - $34,999	27	37.5	72	53	54.6	97	99	65.1	152
$35,000 - $49,999	25	39.7	63	68	55.7	122	109	62.3	175
More than $50,000	51	52.0	98	85	59.0	144	149	63.4	235
Educational Attainment**									
Less than high school	1	6.3	16	12	44.4	27	21	63.6	33
High school graduate	49	39.5	124	84	45.4	185	134	56.3	238
Some college/trade school**	44	44.0	100	81	60.9	133	136	64.5	211
College graduate	36	54.5	66	72	64.3	112	136	70.8	192
Age Group									
16 to 24 years old	16	42.1	38	35	53.8	65	72	71.3	101
25 to 34 years old	64	48.9	131	113	62.4	181	203	70.5	288
35 to 44 years old	34	42.0	81	74	50.7	146	97	54.2	179
45 to 54 years old	8	27.6	29	26	56.5	46	39	52.7	74
55 years or older	11	35.5	31	6	20.7	29	30	54.5	55

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

***The 2001 driver survey did not include a question regarding annual household income.**

****The 2001 survey question regarding education combined "college" and "trade school" into one possible response. Due to this variation from subsequent surveys and to allow for more meaningful analysis and comparison of time series data, the 2001 survey data pertaining to education are not included.**

***** Percentages are calculated based on the total number of respondents that answered this question.**

[8]Retrieved from Automotive Safety Program, Riley Hospital for Children web page regarding *Rear Facing: Why it is Beneficial* on November 18, 2007, from http://www.preventinjury.org/GIBeneficial.asp

Table 9: According to Indiana law, when is it legal for a child to ride in a vehicle using only a seat belt?

	2005		2006	
	Count	%	Count	%
4 years old	18	3.7	11	1.6
6 years old	41	8.4	52	7.5
8 years old	330	67.9	448	64.5
Don't know/not sure	59	12.1	88	12.7
Other	38	7.8	96	13.8
Total respondents	486	100.0	695	100.0

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

Table 10: Number and Percentage of Driver Survey Participants that Correctly Identified Legal Age for a Child to Ride in a Vehicle Using only a Seat Belt, by Income, Education, and Age

	2005			2006		
Annual Household Income*	**Count**	**%**	**Total Respondents*** **	**Count**	**%**	**Total Respondents*** **
Less than $20,000	62	61.4	101	73	60.3	121
$20,000 - $34,999	65	63.7	102	95	62.9	151
$35,000 - $49,999	84	67.2	125	111	63.8	174
More than $50,000	112	76.7	146	164	69.5	236
Educational Attainment**						
Less than high school	17	60.7	28	14	42.4	33
High school graduate	116	59.8	194	146	62.7	233
Some college/trade school**	102	73.9	138	137	64.3	213
College graduate	87	77.0	113	136	70.8	192
Age Group						
16 to 24 years old	41	60.3	68	66	66.0	100
25 to 34 years old	136	72.3	188	199	68.6	290
35 to 44 years old	103	68.2	151	113	63.8	177
45 to 54 years old	31	68.9	45	40	56.3	71
55 years or older	17	54.8	31	30	53.6	56

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

***The 2001 driver survey did not include a question regarding annual household income.**

****The 2001 survey question regarding education combined "college" and "trade school" into one possible response. Due to this variation from subsequent surveys and to allow for more meaningful analysis and comparison of time series data, the 2001 survey data pertaining to education are not included.**

*****Percentages are calculated based on the total number of respondents that answered this question**

als. Nearly one-third of survey participants specified a friend and/or family member. Close to one-quarter reported that they were informed by a doctor and/or via a prenatal class, and 13 percent cited the media. When asked about how they became aware of when to switch a child from a booster seat to a seat belt, respondents cited a few resources relatively equally. Just over one-quarter (27 percent) cited friends and/or family members, 25 percent identified the media, and 21 percent indicated they became aware of the practice via car seat related resources.

As shown in Table 8, awareness of best practices for changing a child's position in CRDs has increased over time across all demographic categories. Those with a higher level of education tend to exhibit greater awareness, with 71 percent of college graduates identifying recommended condi-

tions. Across all income categories, knowledge of conditions for turning child from rear to forward facing has risen between 2003 and 2006. Furthermore, this awareness tends to be highest among respondents from households with more than $50,000 annual income. Knowledge is relatively high among adults of child-bearing and child–rearing age; 71 percent of 16 to 24 and 25 to 34 year olds identified recommended conditions.

Driver Awareness of Indiana Law Regarding Legal Age for Child to Ride in Vehicle Using Only a Seat Belt

According to current Indiana law, all children ages 8 to 16 are required to be in either child restraints or seat belts, in all seating positions at all times. Both the 2005 and 2006 surveys included a question designed to gauge awareness of the legal age to ride in a vehicle using only a seat belt. This question was not included in the 2003 survey instrument. As illustrated in Table 9, results from both years reveal that the majority of survey participants selected the correct response of eight years (from a list that included four and six years). However, driver awareness of this regulation appears to have declined slightly from 68 percent in 2005 to 65 percent in 2006. In both years, roughly one-fifth of respondents opted for a choice of either *four or six years* or *other* and approximately 12 percent were unsure or did not know the legal minimum age requirement.

As with overall results regarding respondent knowledge of the Indiana child restraint law, analysis by annual household income, educational status, and age also reveal a decline in awareness between 2005 and 2006 across most demographic categories (see Table 10). The only groups of respondents that exhibited increased awareness included high school graduates (from 60 to 63 percent) and *16 to 24 year olds* (60 to 66 percent). With both years of data, despite the overall decline in knowledge of the seat belt law, survey results indicate higher rates of awareness as household incomes rise. In 2006, awareness also appears to be related to higher educational attainment.

Driver Awareness of Recommended Minimum Child Age to Ride in Front Seat

The recommended minimum age to ride in the front seats of a vehicle is 13 years. As shown in Table 11, in 2003, from a list of three possible ages—four, nine, and 13 years old—53 percent of respondents cited the correct response. In 2005 and 2006, nearly one-half of survey participants selected 13 years as the recommended minimum age. However, if those that chose 15 years—an option that was added to the 2005 and 2006 surveys and that does not contradict best practices—are taken into account, these percentages increase to 58 percent and 53 percent, respectively. The percentage of respondents who selected a younger age (four or nine years) that deviates

Table 11: What is the minimum age when a child can ride in the front seat of a vehicle?*

	2003		2005		2006	
	Count	%	Count	%	Count	%
4 years	23	7.3	16	3.3	10	1.4
9 years	72	22.9	66	13.4	123	17.5
13 years	168	53.3	245	49.8	330	47.0
15 years	n/a	n/a	41	8.3	44	6.3
Don't know	35	11.1	113	23.0	164	23.4
Other	17	5.4	11	2.2	31	4.4
Total respondents	315	100.0	492	100.0	702	100.0

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

Note: Percentage totals may not add up to 100 due to rounding.

***The 2001 survey results for this question are not included for two reasons. First, while there was slight variation in wording between the 2003, 2005, and 2006 questions, the 2001 version differed more in that the question was open-ended and all three subsequent surveys offered respondents close-ended options. Additionally, the 2001 survey results also were anomalous when compared with subsequent data.**

from best practices has fallen from 30 percent in 2003 to 17 and 19 percent in the two subsequent survey years. The share of respondents who indicated they did not know the recommended minimum age has risen from 11 percent in 2003 to 23 percent in 2005 and 2006.

When considering educational status, a similar trend of overall decline in awareness is observed across nearly all categories. Table 12 shows that reported knowledge of best practices peaked in 2005 among those with a high school degree, some college or trade school, and college graduates. While 70 percent of college graduates identified an age consistent with best practices in 2005, 55 percent did so in 2006. Over all three years of survey results, more than one-half of respondents in nearly all household income groups identified an age—13 or 15 years—that did not violate best practices. When comparing across income groups, respondents in the *more than $50,000* household income bracket exhibited the highest degree of awareness. Knowledge exhibited by those in other income categories was not far behind. Among drivers aged *16 to 24, 25 to 34*, and *45 to 54* years old, survey results demonstrated that over 50 percent of respondents in these age brackets were aware of best practices regarding the minimum age to ride in front.

Table 12: Number and Percentage of Driver Survey Participants that Identified Recommended Minimum Child Age to Ride in Front Seat, by Income, Education, and Age

	2003			2005			2006		
Annual Household Income*	**Count**	**%**	**Total Respondents*** **	**Count**	**%**	**Total Respondents*** **	**Count**	**%**	**Total Respondents*** **
Less than $20,000	41	55.4	74	46	45.1	102	65	52.8	123
$20,000 - $34,999	36	49.3	73	58	56.3	103	83	53.9	154
$35,000 - $49,999	29	46.0	63	71	56.8	125	90	51.4	175
More than $50,000	57	58.8	97	101	68.2	148	129	54.4	237
Educational Attainment**									
Less than high school	11	68.8	16	14	48.3	29	18	52.9	34
High school graduate	69	55.2	125	104	53.3	195	126	52.7	239
Some college/trade school	49	49.5	99	79	56.0	141	112	52.8	212
College graduate	34	51.5	66	80	70.2	114	106	54.6	194
Age Group									
16 to 24 years old	20	51.3	39	35	51.5	68	62	62.0	100
25 to 34 years old	71	53.8	132	117	61.6	190	149	51.2	291
35 to 44 years old	47	59.5	79	90	58.4	154	102	56.7	180
45 to 54 years old	12	41.4	29	27	58.7	46	39	52.7	74
55 years or older	15	46.9	32	15	48.4	31	22	39.3	56

Source: Indiana Child Restraint Survey Data, Automotive Safety Program, Riley Hospital for Children and Indiana University School of Medicine, Division of Biostatistics

***The 2001 driver survey did not include a question regarding annual household income.**

****The 2001 survey question regarding education combined "college" and "trade school" into one possible response. Due to this variation from subsequent surveys and to allow for more meaningful analysis and comparison of time series data, the 2001 survey data pertaining to education are not included.**

*****Percentages are calculated based on the total number of respondents that answered this question.**

CONCLUSION

Research shows that child passenger safety improves greatly through proper usage of child restraints and seat belts and through proper child occupant seating positions. Experts suggest that all children should ride in the back seat of passenger vehicles until they reach 13 years of age. Public awareness campaigns, combined with the enactment and enforcement of strong laws, are the most effective way to increase child restraint usage.[9] While significant improvements in overall child restraint usage have occurred in Indiana since the enactment of the current child restraint law in 2005, more in-depth studies are needed to determine target groups most in need of child restraint device usage training and education.

Experts suggest that all children should ride in the back seat of passenger vehicles until they reach 13 years of age.

[9]National Center for Statistics and Analysis, National Highway Traffic Safety Administration (February 2007), *Traffic Safety Facts: Strengthening Child Passenger Safety Laws.*

INDIANA CHILD PASSENGER SAFETY FACTS

This publication was prepared on behalf of the Automotive Safety Program by the Center for Urban Policy and the Environment. Please direct any questions concerning data in this document to the Automotive Safety Program at 317-274-2977.

An electronic copy of this document can be accessed via the Center website (www.urbancenter.iupui.edu), the Automotive Safety Program website (www.preventinjury.org), or you may contact the Center for Urban Policy and the Environment at 317-261-3000.

Automotive Safety Program at Riley Hospital for Children, Indiana University School of Medicine

The mission of the Automotive Safety Program at Riley Hospital for Children, Indiana University School of Medicine is to reduce injuries and fatalities resulting from motor vehicle crashes in Indiana. The Automotive Safety Program was founded in 1981 by Dr. Marilyn Bull. Funded by the Governor's Council on Impaired & Dangerous Driving, the program directs child passenger safety research, education, and training in the state of Indiana. In addition, the Automotive Safety Program has long been a national leader and expert in transportation of children with special health care needs.

The Indiana Criminal Justice Institute (ICJI)

Guided by a Board of Trustees representing all components of Indiana's criminal and juvenile justice systems, the Indiana Criminal Justice Institute serves as the state's planning agency for criminal justice, juvenile justice, traffic safety, and victim services. ICJI develops long-range strategies for the effective administration of Indiana's criminal and juvenile justice systems and administers federal and state funds to carry out these strategies.

The Governor's Council on Impaired & Dangerous Driving

The Governor's Council on Impaired & Dangerous Driving, a division of the Indiana Criminal Justice Institute, serves as the public opinion catalyst and the implementing body for statewide action to reduce death and injury on Indiana roadways. The Council provides grant funding, training, coordination and ongoing support to state and local traffic safety advocates.

The Center for Urban Policy and the Environment

The Indiana University Center for Urban Policy and the Environment is devoted to supporting economic success for Indiana and a high quality of life for all Hoosiers. An applied research organization, the Center was created by the Indiana University School of Public and Environmental Affairs in 1992. The Center works in partnership with community leaders, business and civic organizations, nonprofits, and government. The Center's work is focused on urban and community development, health policy, and criminal justice research essential to developing strategies to strengthen Indiana's economy and quality of life.

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