BRIEF REPORT

Racial differences in child safety restraint use in Tennessee

V L Gunn, R M Phillippi, W O Cooper

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Objectives: To evaluate the appropriate use of child safety restraints (CSR) in black and white children.

Design: Cross sectional, observational study of drivers of children age 0–10 years involving an on-site vehicle and CSR inspection and brief driver interview.

Results: Data were obtained on 244 white and 204 black children; results were stratified by race due to effect modification of race on driver restraint use and CSR use. Twenty four percent of black and 13% of white child passengers aged 4–10 years were completely unrestrained ($p=0.003$). Of the 168 black and 220 white child passengers aged 0–10 years who were restrained, 64% of black and 58% of white children had inappropriate restraint use. Appropriate CSR use was significantly lower in 4–8 year old passengers compared with appropriately restrained children aged <4 years and 9–10 years ($p<0.0001$ for both black and white child passengers).

Conclusions: Black child passengers and all child passengers aged 4–8 years are at increased risk of being inappropriately restrained. Educational efforts should address specific barriers to booster seat use in these populations.

Injuries sustained in motor vehicle crashes remain the leading cause of morbidity and mortality for US children older than 1 year of age.^{1,2} Of children killed in motor vehicle crashes, 50% are unrestrained.¹ Black children are at particularly high risk of morbidity and mortality from motor vehicle crashes,^{3,4} presumably due to low rates of restraint use;⁴ however, little is known about the overall frequency of appropriate child safety restraint use in black children. The purpose of this study was to evaluate the appropriate use of child safety restraints in black and white children in three urban communities in Tennessee.

METHODS

From April to June, 2004, we conducted a cross sectional, observational study of drivers of children 0–10 years of age involving an on-site vehicle and child safety restraint (CSR) inspection and brief driver interview.

The assessment tool was adapted from a previously studied traffic survey.⁵ Data collected included both observed (driver seat belt use, seating position of children, and restraint type) and self-reported information (child race, sex, age, weight, and height, and driver race). Drivers of inappropriately restrained and unrestrained child passengers 4–8 years of age were asked to identify barriers to booster seat use.

Before the study, regional study coordinators were sent copies of the assessment tool, written instructions with scripted questions, and photographs of various CSR types. Each new assessor completed a “practice” assessment before data collection which was reviewed by the study coordinator. All study coordinators were certified Child Passenger Safety Technicians.

Schools and summer programs representing geographic and income diversity in three urban counties in Tennessee were randomly selected for participation. The drivers of all vehicles entering or leaving the study site were approached, and consent to participate in the study was obtained from each driver before data collection. No data were collected on vehicles when the driver declined to participate. Approximately 80% of drivers approached agreed to participate.

Any use of CSRs was defined as the child passenger secured in any form of restraint device. Appropriate use of CSRs was determined using Tennessee law which requires rear facing CSR for children younger than one year or less than 20 lb; forward facing CSR for children 1–3 years and weighing more than 20 lb; belt positioning booster seats for children 4–8 years and less than 57 inches in height; and seat belts for children 9–16 years and adults.⁶ Poisson regression with robust standard errors was used to model appropriate CSR use, accounting for clustering of children by vehicle. Approval for the study was obtained from the Institutional Review Board of Vanderbilt University prior to implementation.

RESULTS

Data were collected on 244 white and 204 black children who were 0–10 years of age and transported in 432 vehicles at 18 assessment sites. In all cases, the race of the driver and the child passenger was the same. Black and white child passengers had similar age distributions with approximately 23% <4 years, 60% 4–8 years, and 16% 9–10 years (table 1).

Twenty four percent of black and 13% of white child passengers 4–10 years were completely unrestrained ($p=0.003$). Of the 168 black and 220 white child passengers 0–10 years who were restrained, 64% of black and 58% of white children had inappropriate restraint use. All children younger than 4 years of age, and most children >4 years were in some form of restraint. However, appropriate CSR use was lower in black and white children in all age groups. Appropriate CSR use was significantly lower in 4–8 year old passengers compared to appropriately restrained children <4 years and 9–10 years ($p<0.0001$ for both black and white child passengers).

Driver restraint use was significantly associated with any and appropriate CSR use for blacks and whites (table 2).

We asked drivers of children 4–8 years old who were not in booster seats to identify barriers to booster seat use. More white drivers (76%) than black drivers (49%) felt their child was too large for a booster seat ($p=0.002$). This perception was accurate for only 2% of white and black children aged 4–8 years; however, 60% of these children for whom this perception was accurate were unrestrained. More black drivers (25%) than white drivers (14%) did not know the child needed to be in a booster seat. No white drivers and 4% of black drivers stated that the child was not restrained because they could not afford a booster seat (see fig 1).

Abbreviation: CSR, child safety restraint.

Table 1 Child passenger gender and restraint use by race

Characteristic	White	Black
Male child, n (%) ^a	99 (46)	91 (51)
Child passengers, n (% any restraint)		
<4 years	55 (100)	51 (100)
4–8 years	152 (88)	117 (72)
9–10 years	37 (84)	36 (92)
Appropriately restrained child passengers, n (%)		
<4 years	46 (84)	42 (82)
4–8 years	43 (28)	25 (21)
9–10 years	28 (76)	30 (83)
Driver, n (% restrained)	191 (80)	150 (77)

^aSex was not recorded for all child passengers.

DISCUSSION

This study revealed that more black (24%) than white (13%) child passengers were completely unrestrained ($p = 0.003$). This reflects decreased uptake of CSR use among black children, despite national improvements in driver restraint use by black adults.^{7–8} The lack of appropriate restraint use among black child passengers may reflect drivers' diminished risk perceptions regarding the likelihood of having a collision, or of the child passenger sustaining an injury without the use of CSRs.⁹

Booster eligible children ages 4–8 years were also at increased risk of being inappropriately restrained. This has been noted in previous studies and may reflect a lack of knowledge about the need for booster seats and the age and weight requirements for use. Most drivers of 4–8 year olds who were not in a booster seat believed that the child was too large for a booster seat; however this perception was accurate for only 2% of 4–8 year olds. Nearly twice as many black as white drivers cited a lack of knowledge of the need for booster seat use. This difference in knowledge may indicate that educational efforts regarding booster seats do not reach all intended audiences.^{10–11} Although cost of CSRs is frequently cited as an explanation as to why poor and minority children are unrestrained,^{10–12–14} no white drivers and only 4% of black drivers of inappropriately restrained

Figure 1 Driver perception of barriers to booster seat use (n=114).

4–8 year olds cited cost of a booster seat as the reason for non-use.

There are a few limitations to this study. This study was conducted in a single state; thus results may not be generalizable to other populations. We sought to enhance generalizability by including three geographically dispersed urban communities in Tennessee. It is possible that the failure to cite cost as a barrier to CSR use reflected a higher income population; however the sample was obtained from an economically diverse population. Our definition of appropriate CSR use did not include correct attachment of the CSR to the vehicle, thus our results may be greater than other published studies of appropriate CSR use in which CSR installation was considered in determining correct usage.¹⁵

CONCLUSIONS

This study describes appropriate CSR use, and reported reasons for non-use by black and white child passengers. Future efforts to improve CSR use should focus on drivers of 4–8 year olds and drivers of black child passengers because

Table 2 Predictors of any and appropriate child safety restraint use for white and black child passengers^a

Variable	Any restraint use [†]		Appropriate restraint use [‡]	
	Adjusted RR	95% CI	Adjusted RR	95% CI
White child passengers, n = 244				
Child age (years)				
<4	Reference		Reference	
4–8	0.91	0.86, 0.96	0.35	0.27, 0.47
9–10	0.85	0.74, 0.98	0.94	0.76, 1.16
Driver restrained				
No	Reference		Reference	
Yes	1.28	1.06, 1.56	1.74	1.02, 2.95
Black child passengers, n = 204				
Child age (years)				
<4	Reference		Reference	
4–8	0.81	0.71, 0.91	0.29	0.20, 0.43
9–10	0.98	0.89, 1.06	1.07	0.88, 1.30
Driver restrained				
No	Reference		Reference	
Yes	1.89	1.35, 2.64	1.77	1.03, 3.02

^aPoisson regression analysis using general estimating equations to account for clustering of child by vehicle. Model included child age and driver restraint use.

[†]Any restraint defined as: child passenger in any form of restraint device.

[‡]Appropriate restraint defined by age and weight criteria per Tennessee law.⁶

RR, relative risk; CI, confidence interval.

Bold denotes statistical significance.

Key points

- Children aged 4–8 years were frequently inappropriately restrained.
- Black children were more likely to be completely unrestrained than white children.
- Driver restraint use was associated with appropriate child safety restraint (CSR) use.
- Drivers of unrestrained 4–8 year olds incorrectly believed that their passengers were too large for a booster seat and many drivers lacked knowledge about the need for booster seat use.
- Efforts to improve CSR use should focus on drivers of 4–8 year olds and drivers of black child passengers.

these groups are at greatest risk of being unrestrained or inappropriately restrained. Educational efforts should address three specific aspects of booster seat use: driver knowledge about the need for booster seat use, the biometric requirements for appropriate booster seat use, and driver perceptions regarding the challenges of booster seat use.

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Authors' affiliations

V L Gunn, W O Cooper, Department of Pediatrics, Child and Adolescent Health Research Unit, Division of General Pediatrics, Vanderbilt University School of Medicine, Nashville, TN, USA

R M Phillippi, Department of Pediatrics, Emergency Medical Services for Children, Division of Pediatric Critical Care, Vanderbilt University School of Medicine, Nashville, TN, USA

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Correspondence to: Dr V L Gunn, Department of Pediatrics, Child and Adolescent Health Research Unit, Vanderbilt University School of Medicine, AA-0216 MCN, 1215 21st Avenue South, Nashville, TN 37232-2504, USA; veronica.gunn@vanderbilt.edu

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