Carpooling and Booster Seats: A National Survey of Parents

WHAT'S KNOWN ON THIS SUBJECT: Booster seat use improves seat belt fit and reduces risk of injury for children <57 in tall. Booster seat use decreases between ages 4 and 8 years. Children observed riding with other children frequently do not use booster seats.

WHAT THIS STUDY ADDS: In this national survey of parents, we found that a majority of parents of 4- to 8-year-old children carpool, and when they carpool booster seat use is inconsistent. Social norms and self-efficacy appear to influence booster seat use when carpooling.

abstract

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OBJECTIVE: Booster seat use among school-aged children has been consistently lower than national goals. In this study, we sought to explore associations between parental experiences with booster seats and carpooling.

METHODS: We conducted a cross-sectional Web-based survey of a nationally representative panel of US parents in January 2010. As part of a larger survey, parents of 4- to 8-year-old children responded to 12 questions related to booster seats and carpooling.

RESULTS: Of 1612 parents responding to the full survey (response rate = 71%), 706 had a 4- to 8-year-old child and 681 met inclusion rules. Most parents (76%) reported their child used a safety seat when riding in the family car. Of children reported to use seat belts, 74% did so in accordance with their state law. Parent report of child safety seat use was associated with younger child age and with the presence of state booster seat laws. Sixty-four percent of parents carpool. Among parents who carpool and whose children use a child safety seat: 79% indicated they would always ask another driver to use a booster seat for their child and 55% reported they always have their child use their booster seat when driving friends who do not have boosters.

CONCLUSIONS: Carpooling is a common driving situation during which booster seat use is inconsistent. Social norms and self-efficacy are associated with booster seat use. Clinicians who care for children should increase efforts to convey the importance of using the size-appropriate restraint for every child on every trip. *Pediatrics* 2012;129:290–298

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KEY WORDS

car seats, child passenger safety, parental attitudes, survey

ABBREVIATIONS

CI—confidence interval
OR—odds ratio

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Booster seats have been shown to substantially reduce the risk of severe injury in motor vehicle collisions.[1,2] As a result, the National Highway Traffic Safety Administration and American Academy of Pediatrics guidelines for child passenger safety recommend that children use a booster seat from the time they outgrow their forward-facing car seat until they reach 57 in tall.[3,4] Booster seat laws, variously covering 4- to 8-year-old children, have been enacted in 47 US states over the last decade.[5] Passage of laws has increased the number of children who are using booster seats and has led to a reduction in injuries.[6–8] However, child passenger restraint use remains suboptimal, specifically among preschool and school-aged children.[9–12]

Although guidelines and laws are in place to promote child passenger safety, there are practical barriers to following safety recommendations. Based on focus groups with parents of children younger than 9 years of age, Johnston et al[13] proposed a conceptual model in which intention to use booster seats was driven by attitudes, social norms, and self-efficacy. Other studies have revealed that parents of 1- to 4-year-old children did not use child safety seats because of vehicle space constraints (eg, vehicle is too small for all passengers, child safety seats take up too much room) and driving circumstances (eg, other caregivers transporting children, unexpectedly obtaining rides from friends).[14,15]

In an observational study of passenger restraint use in moving vehicles, children expected to use booster seats were more likely to use a seat belt alone when riding with other children.[16] No previous studies have explored issues related to carpooling of children and booster seat use among parents of 4- to 8-year-olds. Understanding barriers to booster seat use as they relate to carpooling may identify targets for interventions to increase the number of child passengers who are consistently restrained according to guidelines. In this national sample of parents, we sought (1) to determine the frequency with which parents drive children other than their own and (2) to explore associations between carpooling frequency and attitudes, norms, and self-efficacy for booster seat use. We hypothesized that carpooling would be associated with lower use of and more negative views of booster seats.

METHODS

In January 2010, we conducted a cross-sectional study of parents of 4-to 8-year-old children as part of the C.S. Mott Children's Hospital National Poll on Children's Health, a recurring online survey of parents and nonparents. Households with parents of children aged 17 or younger were oversampled to improve statistical power for assessing parental views on child health issues.

The C.S. Mott Children's Hospital National Poll on Children's Health is conducted by using Knowledge Networks Web-enabled KnowledgePanel, a probability-based panel designed to be representative of the US population. Initially, participants were selected scientifically by a random selection of telephone numbers (including cell phone numbers) and residential addresses. Persons in selected households were then invited by telephone or by mail to participate in the Web-enabled KnowledgePanel. People who already had computers and Internet service were permitted to participate using their own equipment. For those who agreed to participate but did not already have Internet access, Knowledge Networks provided at no cost a laptop and internet service provider connection.[17] The KnowledgePanel has served as the sampling frame for other national peer-reviewed publications on child health topics.[18–22]

The focus of this study was on parental responses to 12 questions related to carpooling and booster seat use from the larger survey of 51 questions on topics including H1N1 influenza, children's eating behavior, discipline, and parental communication with health care providers. Carpooling and booster seat use questions were developed by the study team by using concepts from the literature regarding child safety seat use.[13–15,23,24] Three questions were related to driving behaviors, 1 related to vehicle space constraints, 2 related to attitudes, 3 related to social norms, and 3 related to self-efficacy for booster seat use (Appendix). Parents provided personal demographic information and self-report of their own seat belt use. The Flesch-Kincaid grade level for the booster seat and carpooling questions was 6.5, calculated by using built-in software in Microsoft Word 2010 (Microsoft Corporation, Redmond, WA).[25] Questions were pilot tested with a sample of 120 respondents. Responses from pilot testing were used to refine survey questions as needed.

The set of 12 booster seat and carpooling questions was provided to the subsample of respondents who indicated that they were the parent, stepparent, or guardian of a child currently 4 to 8 years old who rides in a family car. When parents indicated they had more than one 4- to 8-year-old child, the survey program randomly selected the age of 1 child in this range, about whom the parent was asked to respond.

Eligible parents were first asked, "Which of the following do you use for your child," and selected 1 of the following options: (1) car seat, (2) booster seat, (3) seat belt, or (4) none of the above. Due to the availability of "combination" car seat/booster seats and the inability to verify the safety seat model, responses indicating the child used a car seat (N = 113) or booster (N = 400) were combined and termed

"child safety seat" for analyses. Parents who answered "none of the above" were excluded ($n = 10$) because we could not determine whether this meant another restraint type was used or that the child rides unrestrained.

To determine carpooling frequency, parents were asked, "How often do you transport children other than your own?" and selected from the following responses: 3 or more times per week; 1 to 2 times per week; less than once per week; and never. Based on the lower frequency of responses to the first 2 options, this variable was collapsed into 3 categories for analysis: (1) frequently (carpooling 1 or more times per week); (2) occasionally (carpooling less than once per week); and (3) never carpooling.

All parents were then asked to indicate their degree of agreement with brief statements regarding vehicle space constraints, attitudes, and self-efficacy related to booster seat use. Parents who carpool were asked about social norms and self-efficacy related to their experiences using booster seats when carpooling. Parents who carpool were also asked to select the behavior that best matches what they would do if faced with a hypothetical scenario in which they needed to transport more children than they had available seat belts in the back seat.

As laws may influence social norms, respondents were asked to identify the age requirement for booster seat use in their state. We used the respondent's state of residence and information published by the Insurance Institute for Highway Safety[5] to determine which parents correctly identified the upper age for booster seat use in their state law and to determine if, based on age, the child was restrained in accordance with their state law. The study was approved by the University of Michigan Medical School Institutional Review Board.

Census-based sampling weights provided by Knowledge Networks were applied to the data to enable nationally representative inferences. Weighted percentages for descriptive statistics were calculated and χ^2 statistics were used for bivariate analyses. Safety seat use was compared by child age in relation to state law and demographic characteristics. Parental use of child safety seats, opinions of booster seats, experiences with booster seats, and demographic characteristics were compared across carpooling frequency. A subanalysis of booster seat use when carpooling was performed including only those parents who carpool and reported their child uses a safety seat. Logistic regression analyses were conducted to determine the effect of state laws on child safety seat use controlling for child age and the interaction with carpooling. All analyses were conducted with Stata 11 (Stata Corp, College Station, TX). P values $<.05$ were considered statistically significant.

RESULTS

Study Sample

Responses were received from 1612 of the 2266 parents invited to participate in the full survey (response rate = 71%). Of the responding parents, 706 had a 4- to 8-year-old child. Nine parents were excluded because their child did not ride in a family car, 10 were excluded because their child did not use a safety seat or seat belt, and 6 were excluded due to incomplete responses. Results reflect responses from 681 parents. Demographic characteristics of the study sample are presented in Table 1.

Child Safety Seat Use and State Laws

Overall, 76% of parents indicated that their 4- to 8-year-old child uses a safety seat. Among the 168 children reported to use seat belts, 74% were restrained in accordance with their state law. Half of parents indicated they did not know the age cited in their state booster seat law, 29% correctly identified the age cited in their state booster seat law, and 20% guessed incorrectly. Children living in states where booster seat use was not required for their age had significantly higher odds of seat belt use (odds ratio [OR]: 4.9 [95% confidence interval (CI): 2.72–8.84]) controlling for child age (Fig 1). Child age was also a significant predictor in this analysis, $F = 13.68$, $P < .001$. Parent report of safety seat use for their child was associated with correct identification of the age cited in their state law (82% vs 73%) and parent report of always using a seat belt themselves (94% vs 86%; $P < .05$). Other parental demographic characteristics, child gender, number of children in the family, and carpooling frequency were not significantly associated with self-reported child safety seat use (results not shown).

Carpooling

Sixty-four percent of parents carpool (15% frequently, 49% occasionally) and 36% do not carpool. There were no significant differences in carpooling frequency across demographic characteristics (Table 2). Child safety seat use was significantly associated with state law for booster seat use for the child's age (OR: 5.9 [95% CI: 2.5–14.4]) and with the interaction between carpooling and state booster seat law (OR: 3.1 [95% CI: 1.03–9.53]) but not with carpooling (OR: 0.9 [95% CI: 0.4–1.9]; Fig 2).

Parental Opinions of and Experiences With Booster Seats and Carpooling

Results related to parental opinions of and experiences with booster seats and carpooling are presented in Table 3. Parents who carpool were significantly more likely than parents who never carpool to report their child uses

TABLE 1 Sample Characteristics

		Unweighted $N = 681$	Weighted %
Parent gender	Woman	366	54
	Man	315	46
Parent age, y	<35	240	44
	≥35	441	56
Parent race/ethnicity	White	467	64
	African American	47	7
	Other	54	7
	Hispanic	113	22
Parent education	High school or less	192	38
	Some college	208	31
	College graduate	281	31
Income	<$30 000	97	23
	$30 000–$60 000	192	28
	$60 000–$100 000	242	34
	>$100 000	150	15
Family size	1 child	126	21
	2 children	315	41
	≥3 children	240	38
Child gender	Girl	356	46
	Boy	319	54
Age of child, y	4	122	20
	5	135	20
	6	157	20
	7	131	18
	8	136	22
Child restraint use	Child safety seat	513	76
	Seat belt	168	24
Parent seat belt use	Always uses seat belt	634	92
	Does not always	46	8
Carpooling frequency	Never	235	36
	Occasionally	340	49
	Frequently	106	15

a safety seat in accordance with their state law. Parents who carpool were less likely to agree that it is difficult to make arrangements to have booster seats available for other people's children and that boosters get in the way of being able to use all seats.

Parents of child safety seat users more commonly reported always using booster seats for the children of others than parents whose children use a seat belt (61% vs 23%, $P < .0001$). In analyses limited to parents who carpool and report their child uses a safety seat, we found parents who occasionally carpool were significantly more likely than parents who frequently carpool to report their child always uses a booster seat when riding with their friends who do not (Table 4).

In response to the hypothetical scenario of needing to transport more children than they had available seat belts in the back seat(s), most parents (72%) who carpool indicated that they would call for help from another parent or not transport additional children. However, 19% would have the biggest child sit in front and 9% indicated they would buckle 2 children in 1 belt, have children sit in a cargo area, or sit on the lap of another passenger. There were no significant differences in responses to this scenario when comparing parents who carpool frequently with those who carpool occasionally.

DISCUSSION

To our knowledge, this is the first study to explore the experiences and opinions of parents related to carpooling and booster seat use. The most important findings in this national survey of

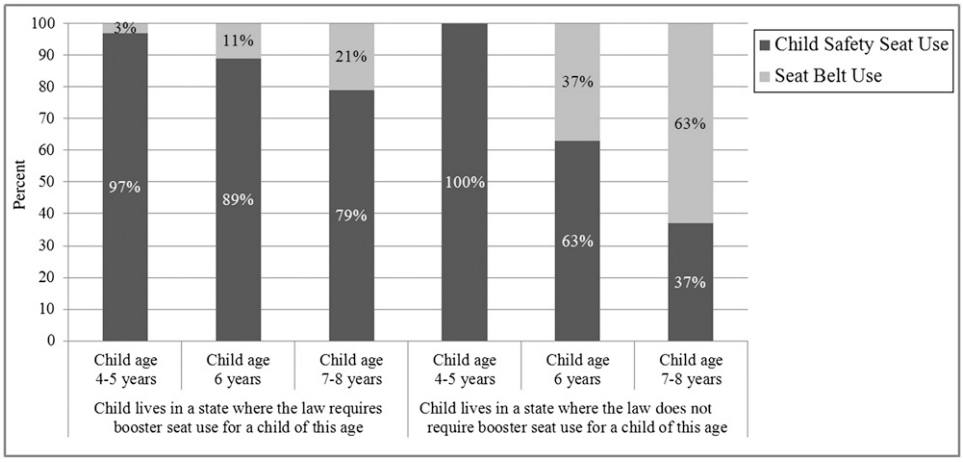

FIGURE 1
Parental report of child passenger restraint use by age and state law.

TABLE 2 Demographic Characteristics by Carpooling Frequency

		Carpooling Frequency			
		Frequently $N = 106$	Occasionally $N = 340$	Never $N = 235$	
		Weighted %			P
Parent Characteristics					
Gender	Woman	51	55	55	.90
	Man	49	45	45	
Age, y	<35	50	43	43	.67
	≥35	50	57	57	
Race/Ethnicity	White	64	62	65	.72
	Hispanic	10	6	8	
	African American	6	7	9	
	Other	20	25	18	
Education	High school or less	33	36	43	.48
	Some college	31	34	27	
	College graduate	36	30	30	
Household income	<$30 000	22	23	21	.76
	$30 000–$60 000	20	30	30	
	$60 000–100 000	37	32	35	
	>$100 000	21	15	14	
Family size	1 child	22	18	25	.38
	2 children	42	39	44	
	≥3 children	36	43	31	
Parent seat belt use	Always uses seat belt	92	92	92	.99
	Does not always	8	8	8	
Child Characteristics					
Gender	Girl	35	49	46	.20
	Boy	65	51	54	
Age, y	4	9	21	24	.31
	5	14	19	23	
	6	24	21	16	
	7	24	17	19	
	8	29	22	18	
Restraint use	Child safety seat	73	77	76	.79
	Seat belt	27	23	24	

parents are that (1) two-thirds of parents of 4- to 8-year-olds carpool children other than their own, and (2) booster seat use when carpooling is inconsistent. In fact, among parents who report using a child safety seat, only half always have their child use a booster seat when riding with friends who do not have boosters and 1 in 5 do not always ask other drivers to use a booster seat for their child. These findings suggest that social norms and self-efficacy for booster seat use may be influential in carpooling situations. Similar themes were endorsed in a statewide survey of parents in which 68% indicated it would be easier to use booster seats if everyone used them; a factor that was significantly more important for mothers than fathers.[26] Further study is needed to determine the extent to which peer interactions between parents and between children contribute to inconsistent use of booster seats when carpooling.

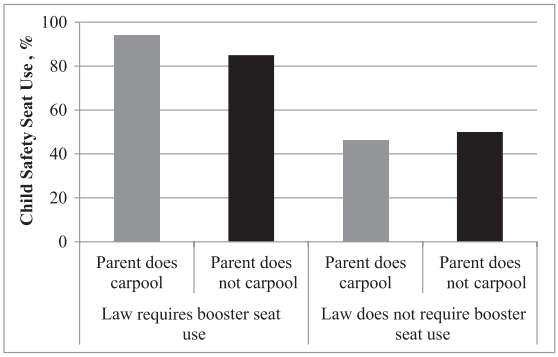

FIGURE 2
Interaction of laws and carpooling on reported child safety seat use.

Our results also suggest that social norms may be set by state booster seat laws. Although more than two-thirds of parents in our study indicated that they would use booster seats even if there were no laws, we found seat belt use was associated with living in a state without a booster seat law covering the child's age. Laws are an important motivator for parents to use booster[23,26,27] and child safety seats.[6,7] Unfortunately, only 2 states[5] require booster seat use after a child's eighth birthday, the historically referenced age to begin seat belt use.[28] No state laws clearly require booster seat use based on child size alone. The current American Academy of Pediatrics recommendations for booster seat use place greater emphasis on child size than child age. Parents are encouraged to use a booster seat until their child reaches a height of 57 in, the height at which proper fit in an adult seat belt is expected.[4] Because parents look to health care providers for information about keeping their child safe, clinical encounters are an important opportunity to emphasize the fact that booster seats improve seat belt fit for children beyond the age limits in many state laws. In addition, closing the gap between current laws and best-practice recommendations for child passenger safety could result in more children using booster seats to their eighth birthday and beyond, when carpooling and on other trips.

TABLE 3 Parental Opinions and Experiences Regarding Booster Seats by Carpooling Frequency

	Carpooling Frequency			
	Frequently	Occasionally	Never	
	Weighted %[a]			*P*
Attitudes: Agree/Strongly Agree				
Even if there were no laws, I would use a booster seat for my child	78	70	68	.23
It is okay for my child to use only a seat belt when they are going on short trips	32	29	28	.89
Norms				
Parent does not correctly identify the age referenced in his or her state's booster seat law	73	69	71	.79
Parent reports his or her child uses a child safety seat in accordance with state law	97	96	89	.003
My child always uses a booster seat when I drive his or her friends who do not have booster seats[b]	32	45	—	.01
Self-Efficacy				
Agree/strongly agree it is difficult to make arrangements to have booster seats available for other people's children	36	33	49	.02
I always ask other people to have my child use a booster seat when they are driving[b]	54	64	—	.36
I always have all 4- to 8-year-old children ride in booster seats[b]	49	52	—	.63
Vehicle Constraints: Agree/Strongly Agree				
Having my child sit in a booster gets in the way of being able to use all the seats in the car	18	15	21	.049

[a] Percentages represent the percent within each carpooling frequency category.
[b] Questions were asked only of parents who carpool.

Additional factors may contribute to inconsistent booster seat use when carpooling. More than one-third of parents in our study perceived difficulties making arrangements to have booster seats available for other people's children. Other studies have revealed difficulties transferring child safety seats between vehicles to be a reason for not using child passenger restraints.[13–15] In contrast to previous studies where vehicle space constraints were a major barrier to child safety seat use,[13,15,27,29] fewer than 20% of parents in our study indicated that booster seats get in the way of using all the seats in the car. Child safety seat design modifications may be 1 approach to provide for more portable and easily transferable booster seats for use when carpooling.

In response to the hypothetical scenario, nearly 75% of parents selected options reflecting optimal transportation safety by indicating they would not transport additional children. Still almost 1 in 10 parents choose options that would place children at increased risk for injury in a motor vehicle collision (eg, buckle 2 children in 1 belt or have children ride in the cargo area). Although this finding represents improvement over a 2001 study of parents where 45% would buckle 2 children in 1 belt,[24] our results indicate there is a continued need to increase parental motivation to ensure that appropriate restraints are used for each child passenger on every trip.

TABLE 4 Booster Seat Use Among Parents Who Carpool and Report Their Child Uses a Safety Seat

	Carpooling Frequency		
	Frequently	Occasionally	
	Weighted %[a]		*P*
Norms			
My child always uses a booster seat when I drive his or her friends who do not have booster seats	45	58	.02
Self-Efficacy			
I always ask other people to have my child use a booster seat when they are driving	73	81	.22
I always have all 4- to 8-year-olds I drive ride in booster seats	61	61	.81

[a] Percentages represent the percent within each carpooling frequency category.

The main limitation to interpretation of our results is that behaviors in our study were self-reported. Self-report of driver seat belt use is known to be higher than observed use.[30] We therefore expect our results overestimate the use of child safety seats and of booster seats during carpooling trips.

Our results show a steady decline in child safety seat use associated with increasing child age consistent with national observational studies of safety seat use.[10,11] However, our results demonstrate higher report of child safety seat use than directly observed for children across the United States where, in 2009, 68% of 4- and 5-year-olds and 39% for 6- and 7-year-olds used safety seats.[11] We also note that 2% of parents responded that their children use "none of the above" restraints, which may reflect use of other restraint types or riding unrestrained. We did not specifically inquire about riding unrestrained. Nationally, approximately 10% of children ride unrestrained[10,11]; however, observational studies capture a single point in time and may not be representative of safety seat use on other trips. The discrepancy between our results and observational studies may reflect social desirability bias. Social desirability bias may also result in an underestimation of negative attitudes toward booster seat use and the

degree to which parents face challenges with using booster seats.

An additional limitation is that we have no ability to verify which type of child passenger restraint a child uses. Given that we did not provide images of child passenger restraints in our survey and that there is a wide range of child passenger restraint products on the market, parents might incorrectly distinguish car seats and booster seats. We cannot estimate the direction of this bias.

Finally, as with any survey, there is potential for participation bias. Because panel members were not aware of the specific survey topics before agreeing to participate, we do not anticipate bias due to systematic nonresponse based on specific content related to child passenger safety.

CONCLUSIONS

Parents report that driving children other than their own 4- to 8-year-old is a common practice. Laws have a strong influence on reported child safety seat use, regardless of parental knowledge of the law. Clinicians should convey to parents that the safety benefits of booster seats go beyond the age limits in existing laws. Parents who report using safety seats for their own children do not consistently do so when carpooling 4- to 8-year-olds nor do they always ask other drivers to use a booster seat for their child. Social norms and self-efficacy may be factors associated with lower booster seat use when carpooling. Clinicians who care for children should inquire not only about size-appropriate child safety seat use but also about the consistency of use and the driving situations that present barriers to use.

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LIBRARY BOOKS: *My in-laws got together to buy three of my children e-readers for Christmas. After opening these gifts on Christmas morning, all were ecstatic and immediately wanted to begin downloading books. This was interesting to me as we already had several hardcover books under the tree that had not garnished much attention. Evidently, the activity of my kids is not surprising to the publisher HarperCollins. According to an article in* The New York Times *(Business: December 24, 2011), HarperCollins sold more e-books on Christmas Day 2010 than any other day ever. Given the strong sales of all types of e-readers, sales of e-books are likely to be even greater this year. While great news for book publishers, the bad news for customers is that they will most likely have to purchase rather than borrow e-books. Until recently, most public libraries could purchase an e-book and then offer patrons the electronic version as many times as desired. From the publisher's point of view, such a policy makes borrowing an e-book from the library too easy and likely to erode sales of paperback books. Borrowing a print copy involves more effort. The borrower has to get to the library, check the book's availability, and wait for its return if someone already checked it out. He or she may become frustrated with the wait and eventually purchase the book. If popular, the book will become worn and eventually need to be replaced. Even with software that prevents more than one person from reading an e-book at a time, the e-book never wears out and does not need replacing. Worried about the potential loss of revenue, major book publishers have approached public library lending in different ways. Many do not make e-books available to libraries or limit the title choices. This year, HarperCollins opted to license use of each e-book copy for a maximum of 26 loans, affecting mainly the most popular titles. Once the e-book has been lent 26 times, the library can purchase another license usually at a lower cost than the first time. Interestingly, with so many major publishers restricting public library access to e-books, hundreds of smaller publishers without blockbuster titles to protect, are rushing to fill the void. They are more than happy to sell their entire catalogue to the library without restrictions. The public library may become a great place to explore less well-known authors.*

Noted by WVR, MD

APPENDIX Survey Questions

Question Topic	Survey Question	Response Options			
Driving behavior	1. Where does your child typically sit in the family car?	a. Front seat b. Back seat c. Does not ride in a family car			
Driving behavior	2. In your family car, which of the following do you use for your child?	a. Car seat b. Booster seat c. Seat belt d. None of the above			
Driving behavior	3. Parents frequently transport other children in addition to their own children in their family vehicle. How often do you transport children other than your own?	a. 3 or more times per week b. 1–2 times per week c. Less than once per week d. Never			
	All parents were asked: Please indicate your opinions on the following for your child. (Select 1 response in each row.)				
Self-efficacy	4. It is difficult to make arrangements to have booster seats available for other people's children.	Strongly Disagree	Disagree	Agree	Strongly Agree
Vehicle space constraint	5. Having my child sit in a booster gets in the way of being able to use all the seats in the car.	Strongly Disagree	Disagree	Agree	Strongly Agree
Attitudes	6. It is okay to have my child use only a seat belt when they are going on short trips.	Strongly Disagree	Disagree	Agree	Strongly Agree
Attitudes	7. Even if there were no laws, I would use a booster seat for my child.	Strongly Disagree	Disagree	Agree	Strongly Agree
Social norms	8. In my state, children are required to be in a booster seat until age:	a. Select age from drop down box b. Not sure c. My state does not have a booster seat law			
	Parents who ever carpool were also asked: Please indicate your experience related to transporting multiple children between 4 and 8 years of age. (Select 1 response in each row.)				
Self-efficacy	9. I have all 4- to 8-year-old children ride in booster seats.	Rarely/never	Sometimes	Most of the time	Always
Social norms	10. My child rides in a booster seat when I am driving his or her friends who do not have booster seats.	Rarely/never	Sometimes	Most of the time	Always
Self-efficacy	11. I ask other people to have my child use a booster seat when they are driving.	Rarely/never	Sometimes	Most of the time	Always
Hypothetical driving behavior – only asked of parents who report carpooling at least occasionally	12. In a situation where I had more children than seat belts in the back seat(s), I would be most likely to (select one):	a. Buckle 2 children in 1 seat belt b. Have smaller children held on someone's lap without a seat belt c. Have children sit on the floor or in the cargo area d. Have the largest child sit in the front e. Call for help from another parent to transport the children f. Not transport the child			

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