

Improving Awareness and Use of Booster Seats in Head Start Families

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ABSTRACT

Objectives: To determine the knowledge level of Head Start providers, parents, and students about booster seats and to directly observe booster seat use before and after a combined educational program and booster seat giveaway.

Methods: Before and after a short educational session and child safety seat giveaway, Head Start providers and parents received a brief questionnaire on booster seats and the state child restraint law. Direct parking-lot observation of booster seat use was performed before and after the giveaway.

Results: Forty-three students were enrolled in the study, with 33 receiving booster seats and 5 receiving forward-facing car seats, dependent on the weight and age of the child. Before the study, 15 (35%) of the children had weight/age appropriate child safety seats; after the giveaway, this number increased to 42 (98%; $P < 0.001$). The proportion of children observed using booster seats before the giveaway was 6%, which increased to 34% after the giveaway ($P < 0.001$).

Conclusions: This study indicates that a booster seat giveaway can be successful in increasing the number of children who use booster seats; however, the majority (66%) of participating children still rode inappropriately restrained after the giveaway. Steps beyond providing booster seats, such as combining this intervention with

ongoing parent and community education efforts, as well as legislation and enforcement, are needed to bring booster seat use to a high level. The information from this study may be helpful in designing future programs intended to increase booster seat use, as well as emphasizing the need for booster seat legislation.

INTRODUCTION

Motor vehicle occupant injuries are the leading cause of death for children age 4-8 years.¹ The American Academy of Pediatrics (AAP) recommends the use of booster seats for children who have outgrown their forward-facing child safety seats, but are too small to use the vehicle's safety belts.² This recommendation normally applies to children weighing 40-80 pounds (18-36 kg; approximately 4-8 years old), unless they are 57 in (145 cm) or taller. However, it is estimated that 81% of children who belong in booster seats do not use them.³ The purpose of a booster seat is to give a child additional height while seated, thereby repositioning the seat belt across the upper thighs and shoulder, rather than across the abdomen and neck. Unfortunately, many children who should use a booster seat are instead restrained only by the vehicle seatbelt.^{4,5} Although approximately 75% of children 0-3 years old and 83% of children 9-15 years old use restraints that are consistent with current recommendations, only 11% of children 4-8 years old use the appropriate restraint.⁶ A recent study shows that some improvement has occurred in the 4-8 year old age range. Between 1998 and 2002 the use of belt positioning booster seats in this age group significantly increased while the use of seat belts concurrently decreased. However, over 60% of these children still remain in adult seat belts.⁷ For children 4-7 years old, the odds of injury in a car crash are 59% lower when restrained in a belt-positioning booster seat as compared with the use of a seat belt.⁸

The purpose of this study was to measure appropriate restraint use in a population of children (3-5 years old) from low-income families enrolled in Head Start

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through direct observation, both before and after a child safety seat giveaway. In addition, the knowledge level of Head Start providers and parents was determined before and after a short educational intervention. The results of this study may be helpful in designing programs intended to increase child safety seat use in young children.

METHODS

This study was approved by the University of Wisconsin Health Sciences Human Subjects Committee. Initial contact with Head Start parents was made by a Head Start provider, and all parents who agreed were approached by the researcher for enrollment in the study. The structure of the study consisted of 3 phases: (1) administration of pretests to the Head Start providers, parents, and children, as well as direct parking lot observation of safety restraint use; (2) a combined booster seat giveaway and education program; and (3) administration of posttests and repeat direct observation of safety restraint use 2 weeks later. Participants were recruited from the 3 Madison, Wis, Head Start sites that have summer programs. All Head Start providers and students affiliated with the summer programs, as well as the parents of the students, were eligible to participate. Those individuals who consented to participate in the study but completed only the pretest were excluded from analysis.

Head Start Providers

A provider was defined as any individual affiliated with Head Start who had regular contact with the children and their parents. These providers included teachers, teacher assistants, and family outreach workers. Providers were given a short survey containing questions about recommended booster seat usage and about the Wisconsin law on child safety seat use, which requires that children younger than 4 years be restrained by child safety seats, and children 4-8 years old be restrained by either a child safety seat or a vehicle seat belt. Each provider then received a 10-15 minute educational presentation about booster seats and the Wisconsin child safety seat law and was retested with the same questions approximately 2 weeks after the presentation.

Head Start Students

Students were visited in the classroom before the booster seat giveaway and asked whether they rode in the front or back of the vehicle, and whether they used a booster seat. They then received a 10-minute educational program on the importance of using booster seats. The students were visited again and asked the

same questions approximately 2 weeks after the booster seat giveaway.

Head Start Parents

The parents of Head Start children were asked questions about the state law pertaining to child safety seats, as well as their use of a child safety seat or booster seat. The same questionnaire was given before the booster seat giveaway and approximately 2 weeks after the giveaway. At the time of the giveaway, the parents received a brochure from SAFE KIDS about booster seats, as well as information about the Wisconsin law on child safety restraint use.

Observation of Safety Restraint Use

We observed study parents in the morning when they dropped off their children at Head Start. The child's position in the vehicle was recorded, as well as the type of restraint used, and any gross misuses of the restraint system (e.g., sitting in the child safety seat with no restraints fastened; using a belt-positioning booster seat with only a lap belt).

Since the study involved 3 Head Start locations in the city of Madison, Wis, the timing of the booster seat intervention was staggered to create an internal control (Figure 1). At Site 1, booster seat use was observed in the parking lot at drop-off time once before the giveaway (T1) and again approximately 2 weeks after the giveaway (T2). Sites 2 and 3 were grouped together and observation occurred twice (T1 and T2) before the giveaway. The observations were approximately 2 weeks apart and the second pre-observation (T2) at Sites 2 and 3 was done after the giveaway at Site 1. Sites 2 and 3 were observed again (T3) approximately 2 weeks after the giveaway at their locations. The time-series observation design at Site 2 and Site 3 was used to control for any external confounding factor during the study.

The weight and age of the child, the vehicle-seat height, and the seat that the parent was most likely to use on a regular basis determined the specific seat given to the family. Forward-facing car seats were distributed if that was the most appropriate choice. If a child had a weight/age appropriate forward-facing child safety seat, but was near graduation to a booster seat, a new hybrid child safety seat (20-80 lb range) was given. Seats were also offered to all siblings of the Head Start child, although siblings were not considered part of this study unless they were also enrolled in Head Start. Booster seats were provided through Ford Motor Company's Boost America program. All other seats were purchased with a grant from the Bureau of Transportation Safety, Wisconsin Department of Transportation.

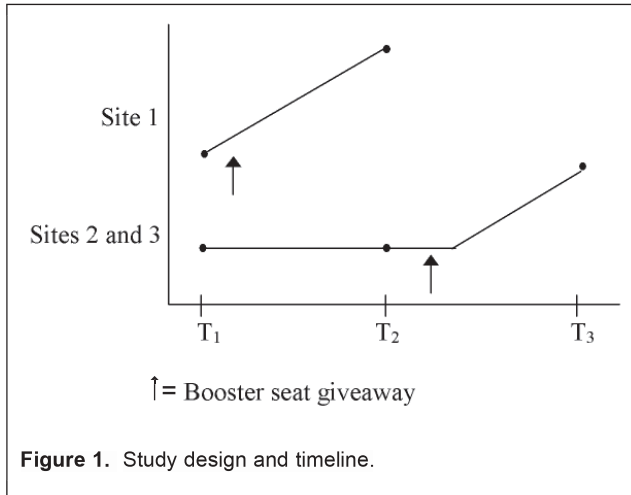


Table 1. Demographics of the Study Population

| | No. (%) |
|------------------------------------|------------|
| Students (n=43) | |
| Gender | |
| Male | 21 (49) |
| Female | 22 (51) |
| Race | |
| African American | 34 (79) |
| White | 2 (5) |
| Hispanic | 7 (16) |
| Age, year | |
| 3 | 8 (19) |
| 4 | 22 (51) |
| 5 | 13 (30) |
| Weight, lb | |
| Mean (range) | 42 (24-70) |
| <40 | 18 (46) |
| ≥40 | 21 (54) |
| Head Start Providers (n=12) | |
| Teacher | 5 (42) |
| Teacher Assistant | 5 (42) |
| Family Outreach Worker | 2 (17) |

Paired data analysis tested change in knowledge and behavior prior to and after the education and booster seat giveaways. The p-values were calculated with McNemar's test and $P < 0.05$ was considered significant. Post-intervention percentages and 95% confidence intervals are presented.

RESULTS

Of the 47 Head Start children enrolled in the study, 4 were excluded because they either left the Head Start program (n=2) or had parents who could not be reached after the initial contact (n=2). The remaining 43 Head Start children had a mean age \pm SD of 55 ± 9 (range 36-

69) months and a mean weight of 42 ± 9 (range 24-70) pounds. All parents who completed both questionnaires were female. The demographics of the study population are shown in Table 1.

Of the 43 children enrolled in the study, before the giveaway 33 children were observed, 6 were missed, and 4 could not be observed because they did not arrive by vehicle. After the giveaway, 38 children were observed, 2 were missed, and 3 did not arrive by vehicle.

Before the giveaway only 4 (12%) children observed were found to use a child safety seat or booster seat correctly. The remaining 29 children observed used a seat belt, used the child safety restraint incorrectly, or rode unrestrained. Booster seats (n=33) and forward-facing car seats (n=5) were distributed to students, with the percentage of students having a weight/age appropriate seat significantly increasing from 35% prior to the study to 98% after the giveaway ([95% CI, 87.7%, 99.9%], $P < 0.001$). Two students rode in vehicles that had no rear lap-shoulder belts. Since each of these vehicles also lacked a front passenger airbag, it was recommended that, in this instance, the booster seat be used in the front seat.

After the booster seat giveaway, the number of children observed riding in a booster seat increased significantly, from 6% to 34% ([95% CI, 20.5%, 49.9%], $P < 0.001$). The small number of children using forward-facing car seats before (2) and after (4) the giveaway showed no significant change. As expected, no change was found in restraint use between the paired T1 (4%) and T2 (4%) pre-giveaway observations at Sites 2 and 3, but a significant increase in booster seat use was observed between the paired T2 and T3 observations (54.2% [95% CI, 32.8%, 74.4%], $P < 0.001$). The type of restraint use observed before and after the booster seat giveaway is shown in Table 2. The observed increase in booster seat use after the booster seat giveaway was accompanied by a student-reported increase in booster seat use. Before the giveaway, 6 (23%) of the students reported always using a booster seat; after the giveaway, 22 (68.8% [95% CI, 49.9%, 83.9%], $P < 0.01$) did.

This study also tested the knowledge level that Head Start providers and parents have about child passenger safety. Two providers who consented to participate and were given the pretest were excluded from analysis because they received no education and no post-test. In both the parent group and the provider group, a high percentage of people knew that there was a law in Wisconsin requiring child safety seat use (Table 3). The number of providers and parents who knew that the Wisconsin law covered children less than 4 years in-

Table 2. Direct Observation of Restraint Use Before and After Booster Seat Giveaway*

| Type of Restraint | No. Before (%) [†] | No. After (%) | P Value [‡] | 95% CI |
|--------------------------|-----------------------------|---------------|----------------------|-------------|
| Appropriate | | | | |
| Booster seat | 2 (6) | 13 (34) | <.001 | 20.5%-49.9% |
| Car seat | 2 (6) | 4 (11) | NS | — |
| Inappropriate | | | | |
| Other/none | 29 (88) | 21 (55) | NS | — |
| Compliant with State Law | 16 (49) | 26 (68) | NS | — |

Note: CI=confidence interval.

*Direct observation data were available for 33 of 43 children prior to and 38 of 43 children after the booster seat giveaway.

[†] Includes T1 from Site 1 and all observations at T1 and T2 from Sites 2 and 3. In cases where 2 pre-observations were done for a given child, no difference in the use of appropriate restraints was noted from one observation to the other.

[‡] NS indicates $P > .05$

Table 3. Booster Seat Knowledge and Self-Reported Use Before and After Booster Seat Giveaway

| | No. Before (%) | No. After (%) | P Value [*] | 95% CI |
|---|----------------|---------------|----------------------|-------------|
| Head Start Providers (n=12) | | | | |
| Aware of child safety seat law | 12 (100) | 12 (100) | NS | — |
| Know age requirement of law | 2 (17) | 7 (58) | <.05 | 27.7%-84.8% |
| Know age/weight range of booster seat use | 1 (8) | 7 (58) | <.05 | 27.7%-84.8% |
| Parents (n=30) | | | | |
| Aware of child safety seat law | 28 (93) | 30 (100) | NS | — |
| Know age requirement of law | 2 (7) | 8 (27) | <.05 | 12.3%-45.9% |
| Students (n=43) | | | | |
| Have appropriate booster/car seat | 15 (35) | 42 (98) | <.001 | 87.7%-99.9% |
| Always use booster seat (self-reported [†]) | 6 (23) | 22 (69) | <.01 | 49.9%-83.9% |

Note: CI=confidence interval.

* NS indicates $P > .05$

[†] n=26 responders before; n=32 responders after

creased significantly when measured 2 weeks after educational intervention (9.5% to 35.7% [95% CI, 21.6%, 52.0%], $P < 0.05$). In addition, providers were asked about the recommended weight range or age group for booster seat use. A significant increase was seen in the number of providers who knew this information (17% to 58% [95% CI, 27.7%, 84.8%], $P < 0.05$). Before the giveaway, 48.5% of parents were compliant with the Wisconsin state law. After the giveaway, the compliance rate was 68.4%.

DISCUSSION

This study found that a booster seat giveaway can be an effective way to increase the use of booster seats. Only 6% of children were observed to ride in booster seats before the intervention. The observed booster seat use increased to 34% after the giveaway ($P < 0.001$). However, a 34% usage rate is still quite low and in-

dicates that the majority of children who should have been using booster seats remained inappropriately restrained after the giveaway. When asked why they do not use booster seats, parents most common responses were that their child was too big to need a booster seat, they had intended to use a booster seat, or that there were problems using the booster seat in their vehicle.⁹

Several sources have made recommendations about increasing car seat and booster seat use. The Task Force on Community Preventive Services currently recommends 4 strategies to increase child safety seat use: distribution programs with education, public information/enforcement campaigns, incentives/education programs, and legislation.¹⁰ More specifically, a review of the booster seat literature prepared by the Center for Applied Behavioral and Evaluation Research suggested providing easy access to booster seats, educating people about the dangers of not using the appropri-

ate restraint, informing families about booster seat use even if their children aren't yet ready to use a booster seat, and making laws consistent with best practice.¹¹ Parents have also given suggestions to increase booster seat use. These have included disseminating the message that booster seats are available, explaining why and for whom they are needed, and passing laws that reflect current best practice.¹²

A recent study has shown that a community-wide campaign to increase booster seat use can be an effective tool. Ebel et al designed a public education campaign that included a wide variety of information about booster seats and various methods of disseminating that information.¹³ They found that communities that received the campaign had higher booster seat usage rates than control communities. Their study is very encouraging and provides an excellent first step in designing and implementing programs intended to increase booster seat use. It is interesting to note that the Ebel et al study and our study achieved similar usage rates (26% and 34%, respectively) with 2 different intervention methods. Although Ebel et al focused on intensive community intervention via education (as compared to a giveaway), our study attempted to place booster seats with all families without a strong emphasis on education. Perhaps combining these 2 methods would result in larger increases than those observed when the techniques are performed separately.

Another study that was similar to ours attempted to increase booster seat use in non-Head Start low-income families.¹⁴ The authors designed a booster seat giveaway and found that prior to intervention, 3% of 4-8 year olds rode in booster seats. Four to 8 weeks later, 38% of children were observed in booster seats. The similarity between their findings and ours reinforces the idea that a giveaway alone is not sufficient to satisfactorily increase booster seat use.

In addition to the aforementioned recommendations, this study suggests that students and teachers/providers may be good education targets because of their frequent interaction with parents and the high level of interest in booster seats expressed during the educational presentations. However, parents did not show the same high degree of interest in the educational presentations. It may be possible to encourage parents to use booster seats if the impetus to do so comes from their children, just as anecdotal evidence shows that children in the National Fire Protection Association (NFPA) Risk Watch® program have influenced their parents to practice fire escape plans, wear bicycle helmets, and ride appropriately restrained in the vehicle.¹⁵

This study also highlights a significant obstacle to achieving optimal booster seat use, namely the difference between best-practice recommendations and real-life situations. In the recommendations found in the current AAP policy statement on selecting appropriate child safety seats, children are to be kept in a full harness until they reach the upper limit of the forward-facing car seat harness system (usually 40 pounds) or are too tall to use the restraint; only at this point should the transition be made to a belt-positioning booster seat.² These same guidelines are offered by the National SAFE KIDS Campaign, with the additional information that the age group for booster seats is about 4 to 8 years.³ However, the National Highway Traffic Safety Administration has recently changed its recommendations, and now suggests using only the age range of 4-8 years for booster seat use, unless the child is taller than 57 in.¹⁶ Using the age range of 4-8 years as a guideline for booster seat use, 35 children (81%) in this study qualified for booster seat use. However, when weight range (40 to 80 lb) was used as the determining guideline, only 21 (54%) children qualified for booster seat use. In the current study, the restraint given to the family was based on what was safe for the child and most compatible with parental desire for use. The discrepancy between weight and age recommendations/guidelines for booster seat use is likely one that most people involved with a booster seat giveaway have encountered. Since the literature and current best practice now emphasize the importance of using the full (harnessed) restraint as long as possible, and not just until children reach their 4th birthday, we feel it is important that current educational information for physicians and parents follow consistent, simple recommendations.² If this does not happen, future efforts to optimize child safety restraint practices may be impeded by the fact that parents believe children should use a booster seat at 4 years, instead of waiting until the child weighs 40 pounds. This same confusion has occurred at the "1 year and 20 lb" transition from a rear-facing to a forward-facing car seat. The AAP now recommends that children remain rear-facing to the maximum weight approval level for the child safety seat in the rear-facing position, even though the child has attained both 1 year of age and 20 lb.²

The current study enrolled Head Start children, who are generally age 3-5 years and from low-income families. Therefore, results of this study may not be generalizable to older-aged children or to families of a higher socioeconomic status.

CONCLUSION

Although booster seat use was increased by means of a booster seat giveaway coupled with an educational program, the overall usage rate, even after the giveaway, remained quite low. Additional interventions beyond a giveaway, such as legislation, incentives to use seats, and community education are needed to achieve higher rates of booster seat use. Current best practice recommends using a full harness until the upper weight limit of the forward-facing car seat is reached and then transitioning to a booster seat. Pediatricians and other health care providers should encourage parents to use booster seats only after the child has outgrown the forward-facing child safety seat.

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REFERENCES

- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Leading causes of death reports, 1999-2001. Available at <http://webapp.cdc.gov/sas-web/ncipc/leadcaus10.html>. Accessed December 29, 2004.
- American Academy of Pediatrics, Committee on Injury and Poison Prevention. Selecting and using the most appropriate car safety seats for growing children: guidelines for counseling parents. *Pediatrics*. 2002;109:550-553.
- Cody BE, Mickalide AD, Paul HP, Colella JM. Child Passengers at Risk in America: A National Study of Restraint Use. Washington, DC: National SAFE KIDS Campaign; 2002.
- Winston FK, Durbin DR, Kallan MJ, Moll, EK. The danger of premature graduation to seat belts for young children. *Pediatrics*. 2000;105:1179-1183.
- Winston FK, Durbin DR. BUCKLE UP! is not enough: enhancing protection of the restrained child. *JAMA*. 1999;281:2070-2072.
- Winston FK, Smith B. Written communication. January 2, 2003.
- Winston FK, Chen IG, Elliott MR, Arbogast KB, Durbin DR. Recent trends in child restraint practices in the United States. *Pediatrics*. 2004;113:e458. Available at <http://pediatrics.aappublications.org/cgi/content/full/113/5/e458>. Accessed December 29, 2004.
- Ebel BE, Koepsell TD, Bennett EE, Rivara FP. Use of child booster seats in motor vehicles following a community campaign. *JAMA*. 2003;289:879-884.
- Ramsey A, Simpson E, Rivara FP. Booster seat use and reasons for nonuse. *Pediatrics*. 2000;106:e20. Available at <http://pediatrics.aappublications.org/cgi/content/full/106/2/e20>. Accessed December 29, 2004.
- Centers for Disease Control and Prevention. Motor-vehicle occupant injury: Strategies for increasing use of child safety seats, increasing use of safety belts, and reducing alcohol-impaired driving. A report on recommendations of the Task Force on Community Preventive Services. *MMWR*. 2001;50(RR-7):6.
- Center for Applied Behavioral and Evaluation Research. Booster seats: a review of the literature on best practices, child fatalities, use and misuse rates, reasons for use and non-use, current strategies, and perceived information needs. Washington, DC: Academy for Educational Development; 2001.
- Simpson EM, Moll EK, Kassam-Adams N, Miller GJ, Winston FK. Barriers to booster seat use and strategies to increase their use. *Pediatrics*. 2002;110:729-736.
- Durbin DR, Elliott MR, Winston FK. Belt-positioning booster seats and reduction in risk of injury among children in vehicle crashes. *JAMA*. 2003;289:2835-2840.
- Apsler R, Formica SW, Rosenthal AF, Robinson K. Increases in booster seat use among children of low income families and variation with age. *Inj Prev*. 2003;9:322-325.
- Appy M-K. Written communication. December 2, 2002.
- National Highway Traffic Safety Administration. Child passenger safety. Available at www.nhtsa.dot.gov/people/injury/childps/. Accessed December 29, 2004.

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