

## INTRODUCTION

Motor vehicle crashes are the leading cause of unintentional morbidity and mortality in children in the United States. Child restraints are vital systems for optimizing child passenger safety. When chosen and installed correctly, child restraints have been demonstrated to significantly reduce the risk of pediatric injury and fatality in motor vehicle crashes. Despite increased emphasis by the public health and medical communities regarding the importance of child restraints, recent studies have shown that the majority of child restraints are used improperly.

## OBJECTIVE

This study aimed to assess the prevalence of specific instances of child restraint misuse and/or inappropriate use in a diverse, urban community. The study also aimed to determine whether vehicle age, child age, and child weight were associated with specific instances of child restraint misuse.

## METHODS

Participants were recruited through advertisements for child restraint inspection events conducted over a 3-year period throughout Los Angeles County, California. During each inspection, Certified Child Passenger Safety Technicians collected information about each child passenger, vehicle, restraint, and aspects of restraint use. Child restraint use was assessed according to 13 specific components of restraint selection and installation.

## RESULTS

Of 1,104 inspected child restraints, 96.2% were installed with at least one instance of misuse. The most commonly observed instances were inappropriate use of the top tether, failure to secure the restraint with the seatbelt in locked mode, and failure to secure the restraint tightly. In older vehicles, restraints were more likely to be installed in front of an airbag and have the seatbelt routed incorrectly. Additionally, older children were more likely to be prematurely restrained in the front vehicle seat and be riding in restraints with inappropriate use of the Lower Anchors and Tethers for Children (LATCH) system.

**TABLE 1. Observed Child Restraint Misuse**

	Yes N (%)	No N (%)
Child restraint facing correct direction	590 (92)	55 (9)
Child restraint not in front of airbag	647 (98)	15 (2)
Child restraint in rear vehicle seat	647 (98)	12 (2)
Harness straps snug	308 (66)	161 (34)
Harness clip present	333 (78)	92 (22)
Harness clip at armpit level	227 (57)	170 (43)
Harness clip threaded properly	251 (62)	154 (38)
LATCH anchor used properly	176 (68)	81 (32)
Top tether used properly	54 (41)	79 (59)
Seatbelt routed properly	301 (74)	104 (26)
Child restraint secured tightly	274 (54)	230 (46)
Seatbelt in locked mode	194 (43)	258 (57)
Child within restraint height/weight limits	294 (75)	96 (25)

**TABLE 2. Logistic Regression Model for Predictors of Selected Instances of Child Restraint Misuse**

	Vehicle Year OR (95% CI)	Child Age OR (95% CI)	Child Weight OR (95% CI)
Direction of restraint			
Correct	1.0	1.0	1.0
Incorrect	0.98 (0.93-1.1)	0.82*(0.70-0.96)	0.98 (0.96-1.0)
Restraint in front of airbag			
No	1.0	1.0	1.0
Yes	0.89*(0.79-1.0)	0.97 (0.76-1.2)	1.0 (0.98-1.0)
Restraint position in car			
Rear seat	1.0	1.0	1.0
Front seat	0.96 (0.87-1.1)	1.2*(1.0-1.5)	1.0 (1.0-1.1)
LATCH lower anchor use			
Correct	1.0	1.0	1.0
Incorrect	0.96 (0.91-1.0)	1.3**(1.1-1.5)	1.0**(1.0-1.1)
Seatbelt routing			
Correct	1.0	1.0	1.0
Incorrect	1.1**(1.0-1.1)	0.96 (0.87-1.1)	1.0 (0.98-1.0)

CI = confidence interval; LATCH = Lower Anchors and Tethers for Children; OR = odds ratio; \* $p < 0.05$ , \*\* $p < 0.01$

**TABLE 3. Recommended Anticipatory Guidance**

**Emphasize to all parents and caregivers the importance of:**

- Using the top tether correctly
- Proper routing of seatbelt through the restraint
- Securing the child restraint tightly to the vehicle seat

**In older vehicles, check that restraints are:**

- Not installed in front of an airbag
- Installed with the seatbelt routed correctly

**Ensure that older, heavier child passengers are not:**

- Prematurely restrained in the front seat
- Riding in restraints with errors in LATCH usage

## CONCLUSION

The vast majority of inspected child restraints were used inappropriately, demonstrating the need to improve child passenger safety practices. The most commonly observed instances of child restraint misuse were inappropriate use of the top tether, failure to have seatbelt in locked mode, and failure to secure the child restraint tightly. In older vehicles, child restraints were more likely to be installed in front of an airbag and have the seatbelt routed incorrectly. Additionally, older child passengers were more likely to be prematurely restrained in the front seat and be riding in restraints with errors in LATCH usage.

In the present investigation, we have identified specific instances of misuse that were more prevalent in older children and older vehicles within a diverse, urban community. Ongoing evaluation of the prevalence of specific instances of child restraint misuse will allow for the identification of at-risk populations and the development of tailored child passenger safety education and outreach.

## CONTACTS

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