

**Methodology for the Observational Survey
of Occupant Restraint Use for 4-8 year olds
Colorado Department of Public Health and Environment**

Background

Observational surveys are commonly used to monitor occupant restraint use in many different settings. The National Highway Traffic Safety Administration (NHTSA), through their National Occupant Protection Use Survey (NOPUS), developed uniform criteria for a national occupant protection use survey and for state surveys.^{1,2}

The NOPUS surveys consist of three separate studies in these settings. The *Moving Traffic Study* obtains shoulder belt use for drivers and right-front passengers in vehicles at interstate/highway exit ramps and controlled or uncontrolled intersections.¹ The *Controlled Intersection Study* provides more detailed information from surveys at intersections with stop signs or traffic signals. Observers record shoulder belt use for drivers and right front seat passengers as well as child restraint information for children under age five in the front and second seats of the vehicle. Age group, sex and race are recorded. “Restrained” is recorded if the child was in a child safety seat or a shoulder belt. Lap belt use is not recorded.³

The limitations of NOPUS for child restraint surveys are: (1) the only age categories for children are <1 year, 1-4, and 5-15, (2) there is a large sampling error since small numbers of children under age 5 are observed, and (3) the survey does not report the restraint system type of children over age 4.³

2003 NOTE: Starting in 2002, the age categories were changed to 0, 1-3, 4-7, and 8-15 and details are collected on the type of car seat. Results for NOPUS in 2002 reported high-back booster use but combined backless booster use with shoulder belt use.⁴

The third type of NOPUS is the *Shopping Center Study*. Parking lots with separate entrances and exit lanes are chosen and restraint use (shoulder belt, lap belt and child safety seat) is observed for driver, right front passenger and rear seat, outboard passengers. While these surveys cannot be collected at statistically selected sites, parking lot surveys do compare closely to the other statistically weighted NOPUS results.⁵

The University of Michigan Transportation Research Institute chose parking lot observation sites for their survey of Michigan children ages 4-15 by using information from the 1995 National Personal Transport Survey (NPTS). The NPTS data indicate that schools, recreation locations, restaurants, and shopping were the most frequent trip destinations for children ages 5-15.⁶

While shopping center (or parking lot) surveys can be effective in obtaining adequate sample size, and provide a method to examine rear seat passenger use, there are still some study limitations: often can't see in the back seat, especially with tinted windows;

difficult to see no-back booster seat use and lap belt use; difficult to estimate the age of a child in a vehicle; and there is often not enough time to examine all vehicle occupants.

Another survey technique is to stop vehicles where there is high traffic of family vehicles, ask permission to interview, and then record restraint use for children in the targeted age range.⁷ The problems inherent with this method are: difficult to get a sample which represents the community; refusal rates could affect the study; requires an Institutional Review Board approval process; and expensive in terms of time and money to obtain an adequate sample size.⁸

*2003 NOTE: A description of a parking lot survey for booster seat use was published in 2003.*⁹

Colorado Booster Seat Observational Study Design

For the Colorado booster seat project, it was decided to modify the shopping center study technique to establish a community-wide sampling scheme and to maximize the observational view of all seating positions.

In the year 2000, the best estimates of booster seat use were national estimates that only 4-6% of children ages 4-8 years use booster seats.^{10,11} In order to establish a baseline estimate with a 95% confidence interval, a sample size of 370 children ages 4-8 in both Colorado Springs (intervention community) and Mesa County (control community) was proposed. This is based on overestimating the current booster seat usage to be 40% of children ages 4-8. This sample size would also provide adequate power (80%) to detect at least a 5% difference in proportions (pre- and post-interventions) using a one-sided, alternative hypothesis and a level of significance of 0.05.¹² Therefore, the proposed observational study design would yield a statistically reliable estimate of booster seat use by children 4-8 years for each community and allow us to document change in booster seat use.

A pilot study was conducted to examine the feasibility of the study protocol. There was an average of 8-10 children ages 4-8 observed per site, and we estimated 10 to 30 children per school site. The study goal was then set at 26 observation sites per community.

Mesa County, Colorado, which contains the city of Grand Junction and a large unincorporated area, was the control community. The control community allows for comparison of booster seat usage in a community without an active promotion program. Mesa County offered a good match to Colorado Springs on motor vehicle death rate, percentage of Hispanics in population, percentage of population with education of < 12 years, and per capita income. The two communities were not a good match based on population (39,000 children ages 4-8 in Colorado Springs vs. 7600 in Mesa County).¹³ Other Colorado counties with a population between 100,000 and 500,000 were considered as control communities, but were not selected because the communities were

either too close to Colorado Springs with a possible contamination of mass media markets, or there was not a good match of demographic characteristics.

The observation site locations were determined by examining the community zip codes. Each zip code was characterized by the 1989 average per capita income,¹⁴ and then the community was divided into two income-based categories as a crude way to ensure community-wide distribution of sites. In Colorado Springs we used the 11 zip codes that represent the most-populated core of the city. In Mesa County we used the six zip codes that comprise Grand Junction and the surrounding “suburbs.” For each zip code the objective was to choose equal number of sites in each of the four categories of school/daycare, grocery store/fast food restaurant, retail store/mall, and recreation area/health department. The observation site locations were not random, but based on criteria such as likelihood of seeing children (the busiest stores, fast food restaurants with play parks), locations where the property owners gave permission, schools with largest number of children being picked up by private vehicles, desire to include two targeted schools in the survey, recreation areas likely to be used by children in winter time (ice-skating rinks, movie theaters with child-oriented shows), and total number of observations needed. In the control community, three sites were observed twice when no other good locations were available (there is only one enclosed mall and only single big box retail store locations in Mesa County).

Site Locations - Colorado Springs

# of Zip Codes	Per Capita Income 1989	School/ Daycare	Fast Food/ Grocery Store	Retail Store/ Mall	Rec. Area
5	9,455-12,157	3	3	4	1
6	13,716-16,845	4	4	6	2

Site Locations - Mesa County

# of Zip Codes	Per Capita Income 1989	School/ Daycare	Fast Food/ Grocery Store	Retail Store/ Mall	Rec. Area
3	9,473-10,610	4	5	6	2
3	13,614-21,217	3	3	6	2

Observation Methods

Observers were recruited from traffic safety coalitions in the two communities. In Colorado Springs, the observers donated their time as part of their commitment to the booster seat promotion project. To the extent possible, we recruited trained NHTSA certified Child Passenger Safety Technicians and parents/teachers of 4-8 year old

children. In the control community the observers were paid an hourly wage. The paid CDPHE program staff provided their time to the project as observers.

The observers attended an initial two-hour training consisting of a one-hour session at an after-school program to observe children and learn how to estimate the ages of children based on height, weight, and behavioral characteristics. The second hour of the training concentrated on how to complete the survey form and observational methods.

A pair of observers (team) was assigned to each observation location. To the extent possible, each pair consisted of one certified technician and one observer comfortable with estimating children's ages. Each team was assigned 5-15 observation sites. In Colorado Springs the observers were asked to observe the majority of the sites either after school, during winter vacation or on weekends. In the control community, the paid observers were assigned locations and times. The observation time period was 20 minutes. All school sites were observed either before or after school attendance times.

Since many of the observation sites required the observers to be on private property, prior permission of property owners was obtained. The appropriate law enforcement agencies where also apprised of the observation times and locations.

At each location, the observers were asked to record basic site information. For each vehicle, they recorded: vehicle type, driver sex, race, and restraint use; and, for each child between the ages of 4-8: the child's sex, race, seat position and restraint use. Each observation pair carried a code-book with instructions on how to fill out the form.

Additional information on how the observational survey was completed is available from CDPHE.

Results

We ended up with 27 observation sites in Colorado Springs and 31 sites in Mesa County. In Colorado Springs, four to five retail stores/mall locations were surveyed twice, using different times of day and time of the week, to obtain an adequate sample size.

We obtained an average of 445 observations in Colorado Springs and 550 in Mesa County. In Colorado Springs each year, there were an average of 134 observations from school sites and 313 from non-school sites, with an average of 19 children observed per school sites and 16 children per non-school sites. In Mesa County, there were an average of 285 observations at school sites and 257 from non-school sites, with an average of 40 children observed per school sites and 8 children per non-school sites.

The observed racial/ethnic distribution of children ages 4-8 closely matched the demographics of each community.

The number of observations was fairly evenly distributed between the two zip code groups, indicating community-wide distribution of sites.

The majority of the observations were done during non-school times to maximize the number of observations and ensure that 4-5 year olds not attending school were not over-represented.

Only one property owner refused to permit the on-site observations.

Additional information on the results of the survey is available from CDPHE.

Limitations of the Survey

- The survey is not a true random sample since the site selection was not random.
- It can be difficult to correctly identify 4-8 year old children. However, using qualified observers and providing training can produce good results.¹⁵
- We were not able to document height and weight so we could not identify correct restraint use. Some of the children may have been appropriately restrained in either a forward-facing car seat with harness or a seatbelt system.
- Even with this sample design it was not always possible to see the restraint use, especially for no-back booster seats and lap belt use. It was easier to get a full view in parking lots as opposed to school sites where the vehicles were moving fast.

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