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Car seat education: A randomized controlled trial of teaching methods

Erin Kuroiwa[a], Rebecca L. Ragar[a], Crystal S. Langlais[a], Angelica Baker[a], Maria E. Linnaus[a,b], David M Notrica[a,b,c,*]

[a] Center for Injury Prevention and Level 1 Pediatric Trauma Center, Phoenix Children's Hospital, Phoenix, AZ, United States
[b] Mayo Clinic Department of Surgery, Phoenix, AZ, United States
[c] University of Arizona College of Medicine – Phoenix, Phoenix, AZ, United States

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ABSTRACT

Objective: To determine if a less labor-intensive video-based program for teaching car seat installation can be as effective as the traditional didactic lecture component.
Methods: This is a randomized controlled trial of caregivers seeking car seat education. Caregivers were assigned to didactic or video-based social learning classes. The didactic class involved live lecture; the social learning class included a brief lecture and the video, *Simple Steps to Child Passenger Safety*, utilizing social learning principles. Proficiency in child passenger safety was evaluated pre- and post-class via: (1) 5-question confidence assessment; (2) 15-question knowledge test; and (3) 5-part car seat installation demonstration. Data were analyzed to compare post-class assessment scores between teaching modalities using pre-test scores as covariates, and correlation of participant confidence and knowledge with installation ability.
Results: 526 individuals registered and were randomized. A total of 213 arrived for class with 103 randomized to didactic teaching and 111 to social learning. Didactics and social learning groups showed similar increases in post-class confidence, knowledge, and installation ability. In the pre-class assessment, 16% of participants in each group installed the car seat correctly. After controlling for baseline installation ability, correct post-class car seat installation did not vary between groups (mean difference = 0.001; p = 0.964). Among participants with high scores on the knowledge assessment, only 57% could demonstrate correct car seat installation (r_s = 0.160, p = 0.023).
Conclusion: Video-based social learning methodology, which requires less time and resources, was as effective in teaching child passenger safety as didactic lecture. Both teaching methods significantly improved proficiency in child passenger restraint. Car seat installation knowledge is only weakly correlated with proper installation ability and proper installation remains a challenge, even after education.

Introduction

Motor vehicle crashes (MVCs) are the leading cause of pediatric injury mortality in the United States [1]. When correctly installed and utilized, child safety seats reduce the risk of fatal injury by an estimated 71% for infants and 54% for toddlers [2]. Parent knowledge and ability to correctly use car seats are essential to ensure children are safely restrained at each age. Unfortunately, studies have found as 25–46% of children who died in MVCs are unrestrained [2–5]. The observed rates of inappropriately restrained and unrestrained children are highest in minority and low-income populations, making understanding of optimal and effective education efforts for these populations important [6–8].

Previous studies have demonstrated the effectiveness of child passenger safety education coupled with car seat distribution programs to increase and improve the rates of proper car seat usage [8–12]. However, there is limited research identifying an optimal teaching strategy [9,10]. Traditionally, car seat community outreach program classes have been predominantly didactic, relying on lecture formats and live demonstrations [11,12]. Other teaching methods have evolved to include resource-intense one-on-one car seat installation and education with a certified child passenger safety technician (CPST) [8]. However, in some of the highest-risk communities, the resources for community outreach

Abbreviations: CPST, child passenger safety technician; DVD, digital video disc; FMVSS, Federal Motor Vehicle Safety Standards; LATCH, lower anchors and tethers for children; MVC, motor vehicle crash; PCH, Phoenix Children's Hospital.

* Corresponding author. Phoenix Children's Hospital, 1919 E. Thomas Rd., Phoenix, AZ 85016, United States.
E-mail address: dnotrica@phoenixchildrens.com (D.M. Notrica).

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programs are limited. Optimal strategies for car seat education would be both effective and cost-efficient.

The social learning teaching methods are proven beneficial in promoting health-behavior change [13]. Bandura's social learning theory hypothesizes that people learn and change their behavior by observation and modeling [14]. Phoenix Children's Hospital's (PCH) Kids Ride Safe program developed a social learning teaching method incorporating group discussion, video education, and coaching during car seat installation. To support use of this technique, we compared a video-based social learning teaching method to traditional didactic techniques in increasing proficiency in child passenger safety, including car seat installation. We postulated the social learning teaching method would lead to an equal or greater increase in caregiver child passenger safety proficiency when compared to the traditional didactic method.

Patients and methods

Design

An observer-blinded, randomized controlled trial was conducted of two car seat community outreach education methods using a cross-sectional sample of participants in the PCH Kids Ride Safe Program between September 2011 and January 2013. The PCH Institutional Review Board approved the study. The study has been registered at clinicaltrials.gov (NCT02720289).

Setting

The Kids Ride Safe program aims to keep children safe in and around cars. Phoenix, Arizona is an urban community which includes a high proportion of Hispanic and low-income families. A priority program for Kids Ride Safe focuses on providing bilingual car passenger education, car seat distribution, and supervised car seat installation for families with young children.

Participants and randomization

Parents or caregivers of car seat-age children (age zero to three years) or expecting parents who participated in the Kids Ride Safe Program were eligible to partake in the study. Program participation was only available to parents or caregivers who spoke English or Spanish. Partner organizations marketed the opportunity to attend the class, and interested parents and caregivers who met the eligibility criteria called PCH Injury Prevention Center to register. At the time of registration, participants were randomized in a 1:1 ratio to either a didactic or video-based social learning session using a computer-generated random allocation sequence. Upon arrival, only parents who consented to participate in the study were enrolled. Participants who enrolled and later refused to individually complete either the pre- or post- installation were excluded.

Intervention

Subjects participated in one of 47 child passenger safety classes held on weekdays during business hours. Average class size was five participants. Classes were taught in English or Spanish by one of two CPST. Each of the intervention groups had teaching scripts to ensure consistency of the educational sessions.

The traditional didactic car seat class was administered using a lecture format. A CPST taught the four steps for child passenger safety (rear facing seat, forward facing seat, booster seat, and seat belt/shoulder harness) and participants received verbal instructions about car seat installation in the vehicle. Participants did not have a live demonstration of car seat installation. Total average class time was 120 min. The materials necessary to execute the class were: car seats used for demonstration and distribution, and educational handouts.

The social learning car seat class included a brief (approximately 10 min) lecture by a CPST describing the four steps of child passenger safety followed by the viewing of the car seat video, *Simple Steps to Child Passenger Safety* (2011), created by Living Legacy Productions [15]. *Simple Steps* was available in English and Spanish; the content of the video is identical in both languages. The video utilizes Bandura's social learning theory by showing parents as role models methodically teaching proper car seat installation in a vehicle [14]. *Simple Steps* includes important subjects such as: LATCH (Lower Anchors and Tethers for Children), identifying and using different types of seatbelt systems, and proper harness use. Total average class time was 90 min. The materials necessary to execute the class were: car seats used for demonstration and distribution, educational handouts, the *Simple Steps to Child Passenger Safety* video, one laptop for the instructor, and a projector.

Measures and definitions

Each subject was asked to provide information on basic demographics, the number of children in the household, and previous car seat use. Both classes included three pre- and post-class assessments of the participant's proficiency in child passenger safety consisting of (1) a confidence assessment, (2) an objective question and answer test created by Living Legacy Productions Inc [16], and (3) car seat installation demonstration. The questions and indicators on the post-test were identical to the pre-test. First, participants recorded their confidence in their ability to correctly install a car seat in a five question 10-point Likert scale confidence assessment (1 not confident; 10 confident). Second, the 15-question objective test measured knowledge of the four steps for child passenger safety and the LATCH system. The test contained true/false, multiple-choice, and fill-in-the-blank questions. Confidence was defined as participants answering 9–10 (Likert scale) on all questions. Knowledge was considered sufficient (passing) for participants scoring at least 10 of 15 on the objective assessment. Finally, proper car seat installation was measured by a CPST using a Kids Ride Safe Program assessment tool that documents the 5 areas of installation: direction, location, mechanism (seatbelt or lower anchors), harness position, and tether use. Each participant was asked to install a car seat in their vehicle prior to, and following, the educational session. During the car seat installation demonstration test, participants were only evaluated on installation demonstration areas relevant to their vehicle and car seat. Installation was correct only for participants receiving a full score (for all aspects pertaining to the vehicle). The CPST evaluating the installation was blinded to the class education method the participant was assigned; one CPST conducted all of the evaluations. Total time for testing and installation evaluation was typically 20 to 25 min.

Data analysis

Prior to enrollment, a sample size of 100 participants per class was calculated based on 80% power at the 5% significance level.

Descriptive statistics were used to examine the characteristics of the study population; data are summarized as frequency and percentages. Responses to pre- and post-test questions were graded as correct or incorrect. Frequencies of correct and incorrect responses were analyzed for associations between classes. Pre- and post- test assessments use ordinal scale (0–10). Ordinal data were treated as continuous data with assumption of equally spaced successive categories. Analysis of covariance (ANCOVA) was used

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