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Evaluation of the *Boost 'em in the Back Seat Program*: Using fear and efficacy to increase booster seat use

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ABSTRACT

Objectives: Recent research supports the use of high-threat messages when they are targeted appropriately and designed to promote high efficacy as well as fear. This research examined the effectiveness of using a novel threat-appeal approach to encourage parents to place their children in booster seats and rear seats of vehicles.
Method: A 6-min video-intervention was created and evaluated at after-school/daycare centers via an interrupted time series design with similar control sites for comparison. Caregivers ($N = 226$) completed knowledge and practice surveys and fear and efficacy estimations related to childhood motor vehicle hazards. Researchers observed booster-seat and rear-seat use in study site parking lots.
Results: Compared to baseline and control assessments, the treatment groups' child passenger safety knowledge, risk-reduction attitudes, behavioral intentions, sense of fear related to the hazard, and sense of efficacy related to the recommended behaviors increased significantly. Further, observed overall restraint use and booster-seat use increased significantly following the intervention.
Conclusions: Applying high-threat messages to child passenger safety interventions is promising and has the potential to be adapted to other health risk areas.

1. Introduction

Motor vehicle crashes are the leading cause of death for children (Centers for Disease Control and Prevention, 2007). In 2005, 1946 children aged 0–14 died and 234,000 children were injured in motor vehicle crashes in the US (National Highway Traffic Safety Administration [NHTSA] 2006). The primary reasons for injuries to children who are restrained at the time of crashes relate to premature graduation to safety belts, misuse of child safety seats, and children seated in front seats (Braver et al., 1998; Winston and Durbin, 1999). Rear seating can reduce the risk of death to child passengers (age 12 and under) by as much as 46% (Braver et al., 1998); however, 30% of US children are permitted to ride in the front seat (Durbin et al., 2004; Ferguson et al., 2000).

Once children outgrow traditional safety seats, booster seats are recommended prior to transitioning to safety belts alone. The chances of crash injury to children aged 4–7 are 59% lower when riding in belt-positioning booster seats than when riding in seat belts alone (Durbin et al., 2003); however, only 41% of 4- to 8-year-old US children travel in booster seats (Glassbrenner and Ye, 2007). The booster seat's primary function is to raise the child higher so the vehicle belt system fits correctly, with the lap portion low on the hips and the shoulder belt snug across the chest and shoulder (NHTSA, 2001). Booster seats are recommended for use until a child grows to approximately 4 ft 9 in. tall and 80 pounds (lbs.) (usually 8 years of age) in order to reduce the risk of abdominal, spinal cord, and brain injuries in a crash (NHTSA, 2001; Winston and Durbin, 1999; Zuckerbraun et al., 2004).

Booster seat interventions have had a positive impact on trends, as booster restraint use has increased dramatically since the late 1990s (from around 5% to 41%) and some caregivers readily seek out and adopt best practice recommendations. Recommended and empirically supported interventions for child passenger safety include laws, enforcement, and enhanced education campaigns (e.g., distribution plus education, enforcement plus education, incentives plus education) (Decina et al., 2008; Ehiri et al., 2006; Winston et al., 2007). Booster seat legislation, especially, coupled with highly publicized enforcement has had dramatic beneficial effects on the appropriate restraint use of booster-aged children. A great number of states have enacted booster seat laws in the last decade (increasing from 11 states in 2000 to 39 states in 2008)

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(Decina et al., 2008). In a study of restraint use among 6102 four- to seven-year-old children involved in crashes across the U.S., children in states with booster seat laws were 39% more likely to be restrained in booster seats than children in states without such provisions (Winston et al., 2007). Unfortunately, the effectiveness of booster seat provisions is hampered by great variation in age, height, and weight specifications (Decina et al., 2008). Currently in 2008, over half of the states with booster seat laws have provisions that are below best practice standards for age and weight (Decina et al., 2008). Such loopholes leave many children unprotected as parents look to legislation for guidance on best practice. The Commonwealth of Virginia in which this study took place, for instance, had a provision in place at the time of this study that only required a child restraint/booster seat for children age 5 and under. (Note that Virginia's new law enacted July 1, 2007 after completion of this study now requires a child restraint until a child's 8th birthday.)

Despite increases in booster seat use in recent years, the fact remains that many parents (almost 60%) of booster-age children do not own a booster seat and most are misinformed about guidelines (especially recommended ages) for use (Lee et al., 2003; Rivara et al., 2001). Thus, safety advocates must remain vigilant in trying to reach these caregivers. Misuse and nonuse of safety restraints involves a complex interplay of determinants, including but not limited to perception of risk, parenting style, and personal beliefs (Kim, 1992; Simpson et al., 2002; Will, 2005). Despite some noteworthy successes, strong support for community-based education programs is lacking, as few studies have employed sound designs and rigorous evaluation methods (Ehiri et al., 2006; Klassen et al., 2000; Turner et al., 2004). Caregivers of booster-aged children are a particularly difficult population to reach because they (a) do not consider their children to be of "safety seat" age, and (b) have inherently low perceptions of vulnerability to crash injury (Will, 2005). Unfortunately, many booster-seat programs fail to reach many parents in the intended population because they are primarily informational in nature and rely on caregivers to seek out and attend to the information (Will, 2005).

Risk communication research and other health behavior theories demonstrate that recognition of personal vulnerability to a hazard is a necessary prerequisite to health behavior change (Bandura, 1986; Sandman, 1991; Slovic, 1991; Weinstein, 1988). Therefore, it is important to consider the audience's perceptions when designing health risk messages. Indeed, a key assumption of the transtheoretical model is that at-risk populations who are not prepared for action (e.g., are in the precontemplation stage) will not respond to action-oriented health promotion programs (Prochaska, 1979; Prochaska et al., 1998). Further, the Precaution Adoption Process model (Weinstein, 1988; Weinstein and Sandman, 1992) specifies that in the adoption of preventive action, people must realize (a) there is a risk, (b) it is significant and can affect others, and (c) they, too, are vulnerable to the risk. Without perceptions of vulnerability, people remain unengaged, even if fully aware of the problem. While situational obstacles (e.g., the lack of a central place for parents to turn for "expert" safety guidance) are believed to influence *actual adoption* of a protective behavior, feelings of vulnerability are crucial for a person's *decision* to take precautionary action (Weinstein et al., 1998). To be cost-effective for mass distribution of information, traditional child passenger safety campaigns must communicate risk more effectively and do so in accordance with social marketing principles (Kotler and Zaltman, 1971; Will, 2005).

Despite many years of conflicting evidence (Janis and Feshbach, 1953; Lewis et al., 2007; Robertson et al., 1974), recent research on the Extended Parallel Process Model (EPPM) (Witte, 1992, 1998) has afforded researchers a clearer understanding of why and how threat-appeal messages (formerly known as scare tactics or fear appeals) work in some instances and fail in others. Research now supports the use of threat-appeals when they contain both a high threat component *and* a high efficacy component (Witte, 1998; Witte and Allen, 2000). Promoting confidence in one's ability to carry out the behavior (self-efficacy) and confidence that the intervention will work (response-efficacy) are just as important as promoting fear.

According to the EPPM, people faced with a health threat are either motivated to control the danger (by adopting the protective behavior) or to control their fear about the danger (by tuning out the message) (Witte, 1992; Witte, 1998). Message recipients weigh their risk of experiencing the health threat (e.g., their child being injured in a crash) against actions they can take that would avert the health threat (e.g., using a booster seat). When perceived threat and perceived self- and response-efficacy are high (i.e., an "I can do it and it will work" attitude is present), people are motivated to control the danger by adhering to recommended responses (Witte, 1998; Witte and Allen, 2000). However, when fear of the threat exceeds efficacy for protecting oneself, fear tactics fail because people are motivated to control the fear. Thus, fear tactics are a useful tool for intervention *only* if they are properly designed and used when the audience and target behavior are appropriate.

Threat-appeal tactics are particularly desirable when perception of vulnerability is low, as is the case with parents of booster-aged children (Will, 2005). Effective messaging for child passenger safety must simultaneously inform, persuade, evoke high emotion, create feelings of vulnerability, and instill in parents a high sense of efficacy for protecting their children. Despite an extensive review of the literature, the authors are not aware of another child passenger safety program that encourages the adoption of safety recommendations by specifically targeting an increase in caregivers' perceptions of risk for motor vehicle hazards. The *Boost 'em in the Back Seat Safe Ride Program* was specifically designed to accomplish this goal, with the aim of increasing booster-seat and rear-seat use among 4- to 8-year-old children. A 6-min video-intervention was created that evoked a high sense of vulnerability to motor vehicle hazards (threat component) *and* provided parents with the knowledge to protect one's family from motor vehicle risks (efficacy component). It was hypothesized that families exposed to the video-intervention, compared to baseline and to those in the control schools, would have (a) increased knowledge and more favorable attitudes regarding booster-seat and rear-seat use; (b) increased fear and efficacy related to the hazard; and (c) greater use of booster seats and rear vehicle seats when age-appropriate.

2. Method

2.1. Settings and participants

The effectiveness of the video program was evaluated in southeastern Virginia at two large after-school/daycare programs, using two similar after-school/daycare controls for comparison. The 4 schools were all different branches/locations operated by one managing daycare organization. This organization was recruited via phone calls and meetings introducing the study. The 4 daycare branches were then randomized into control or intervention groups. Daycare sites were ideal for this initial pilot evaluation of the video because they permitted frequent contact with parents (for surveys and controlled video viewing) and daily observation of children's booster seat use in parking lots. Although elementary schools would have been ideal for capturing the most children in our target age range, the fact that most children are bused to school would have prohibited direct observation of children's booster use. Nevertheless, 63% and 61% of participants in the intervention and

Table 1
Demographics for participants by group.

Descriptor (n = 100)	Intervention (%) (n = 126)	Control (%) (n = 226)	Total sample (%)
Gender			
Male	16.3	22.6	19.8
Female	83.7	77.4	80.2
Caregiver category			
Parent/Step-Parent	94.0	92.1	93.0
Grandparent	5.0	6.3	5.8
Aunt/Uncle	–	1.6	.9
Other	1.0	–	.4
Ethnicity			
African American	62.0	56.3	58.5
Asian/Pac. Island	2.0	2.4	2.2
Caucasian	24.0	34.1	30.0
Hispanic	6.0	2.4	4.0
Native American	1.0	0.8	.9
Other	5.0	4.0	4.4
Education level			
Some High School	2.0	1.6	1.7
High School/GED	25.0	15.9	20.0
Some College	30.0	39.7	35.4
2-Year Degree	12.0	8.7	10.2
Bachelor's Degree	22.0	20.6	21.2
Graduate Degree	9.0	13.5	11.5
SES level			
US$ 0–15,999	20.4	18.5	19.4
US$ 16,000–24,999	31.7	15.4	22.5
US$ 25,000–49,999	26.5	17.7	21.6
US$ 50,000–99,999	16.3	34.7	26.6
>US$ 100,000	5.1	13.7	9.9
Child's age			
No. of Children per group[a]	153	197	350
0–2 Years old	25.0	29.0	28.0
3–4 Years old	34.0	33.0	33.0
5–6 Years old	15.0	13.0	14.0
7–8 Years old	10.0	10.0	10.0
9–13 Years old	16.0	15.0	15.0

[a] Values not in percentage.

control groups, respectively, reported having children in the 4- to 8-year-old age range. All caregivers who wanted to participate were enrolled in the study because the daycare sites strongly preferred that no families be excluded, and because parents of infants and toddlers could benefit by learning the benefits of booster seat use in advance.

A total of 226 caregivers (100 intervention; 126 control) were included in the survey study. Only 1 caregiver per family participated. As can be seen by the participant demographics presented in Table 1, the two study groups were quite similar. Most participants were female (80.2%), parents/step-parents (93%), African American (58.5%), and most had some post-secondary education (35.4%). Participants were fairly evenly distributed across all income levels. The proportion of eligible families who participated in the study was 54% and 84% for the intervention and control groups, respectively. The lower proportion in the intervention group is unfortunate but not surprising, given that the time commitment (survey *plus* intervention) for participation was double that of the control group. Nevertheless, over half of the families with children enrolled in the intervention sites participated in the study and saw the video.

Regarding parking lot observations, a total of 3382 (1925 intervention and 1457 control) anonymous occupant safety observations of children in parking lots were conducted over 20 weeks. Weekly observations at each site meant that roughly the same occupants were being observed once weekly during drop-off times. The participant pool for observations included every child in the daycare sites, as observations of public behavior did not require informed consent. Additionally, informed consent would most assuredly inflate restraint use. This allowed for tracking of trend changes in the groups. Daycare site records indicate the demographic makeup of the children observed at the intervention sites was 54% male, 71% African American, 20% Caucasian, and 9% other racial groups. The demographic makeup of children observed at the control sites was 58% male, 75% African American, 19% Caucasian, and 6% other racial groups. Both groups had a large proportion of families in lower socioeconomic status ranges, with 63% of the intervention group and 55% of the control group having family incomes below US$ 25,000.

2.2. Materials

2.2.1. Video

The research team worked with a professional video production company to create the 6-min *Boost 'em in the Back Seat* intervention video, which is intended for caregivers and targets booster-seat and rear-seat use among 4- to 8-year-old children. The video is a unique child safety intervention, as it includes messages of high-threat consequences (without gore) to motivate action. To increase perception of risk related to the hazard, the video: (a) includes images that evoke high emotion; (b) uses crash-test footage and computer-generated simulations to portray the power of crash forces; (c) uses case stories; (d) avoids jargon and statistics; (e) relates specific consequences to noncompliance; and (f) utilizes well-respected experts to deliver messages.

The 6-min video opens with a mother and her child getting into a frontal collision; the child in the backseat lunges forward and hits his head on the back of the front passenger seat. Next, internal ambulance shots show the paramedics working on the conscious child, who is strapped to a back-board, wearing an oxygen mask, neck brace, and IV lines and is connected to monitors. The mother looks on in shock as her child falls unconscious and the paramedics work to stabilize the boy. In the emergency room, the distraught mother exclaims that he was wearing his seat belt and is clearly confused about why he is in such critical condition. The emergency physician arrives, and after examining the child, talks to mom about the crash. The video then flashes back to the mother and child getting in the car earlier that day. The child gets into the back seat of the vehicle, buckles his belt, slides forward, and puts the shoulder portion of the safety belt behind him. The viewer sees that the child, who is clearly too small and should be in a booster seat, was wearing only an improperly positioned safety belt at the time of the crash.

The video then educates caregivers about the dangers of riding unrestrained and of prematurely graduating a young child to an adult seatbelt. Height, weight, and age guidelines are given for booster-seat use and back-seat use. Education is achieved through the use of narration combined with computer simulations and crash-test footage, as well as brief interview segments with a physician and traffic safety expert. Spread throughout the video, the crash test footage segments not only portray the power of crash forces, but also depict and compare young child occupants who are (a) unrestrained (b) restrained in lap and shoulder belts, (c) restrained with the shoulder belt placed under the arm or behind the child, and (d) properly restrained in a booster seat. Through the use of split-screens and accompanying narration, the differential crash forces and injury potentials are readily evident to lay viewers.

Because high efficacy is a crucial factor in motivating health behaviors using threat appeals (Leventhal and Cameron, 1994; Witte, 1998; Witte and Allen, 2000), a good portion of the video is also devoted to enhancing caregivers' self-efficacy and response efficacy related to booster-seat use. This is achieved by combating key barriers cited by caregivers as reasons for nonuse of booster seats. A mother models and discusses how easy booster seat installation is, and also talks about techniques she used to get her daughter to accept and use a booster seat. A traffic safety advocate also provides tips for parents and discusses the low cost of booster seats.

The video ends with the ER doctor discussing how devastating it is for him to see a child in the emergency room because he was improperly restrained. The video then shows the boy being pushed in a wheelchair out to a van by his mother and father. The van is equipped with a wheelchair lift, and it is revealed that the boy from the opening car crash is now paralyzed.

2.2.2. Knowledge, attitude, and practice survey

The 2-page *Kids in Kars Survey* (*KIKS*) was administered immediately prior to and immediately following the video. The survey measures parents' knowledge of recommended guidelines for rear-seat and booster-seat use, as well as their attitudes towards these guidelines. This measure was designed by the research team utilizing best practice standards for child occupant protection and existing literature and reviewed informally for content validity by colleagues with relevant expertise. The scale consists of 23 questions measuring knowledge of and attitudes towards child passenger safety recommendations. A sample item is, "Booster seats are recommended for 7-year-olds." The KIKS survey uses a 5-point Likert-type response format (Strongly Agree to Strongly Disagree) and has excellent internal consistency ($\alpha = .92$).

2.2.3. Risk Behavior Diagnosis Scale

The *Risk Behavior Diagnosis Scale* (RBDS) (Witte et al., 1996) was also administered immediately prior to and immediately following the video. The 12-item RBDS assesses perceptions of threat and efficacy using a 5-point Likert-type response format. The RBDS is based upon the EPPM, which is the leading theory for predicting the success or failure of health risk messages (Witte, 1992; Witte, 1998). The RBDS is a template designed to be tailored for evaluation of any health risk message targeting any health behavior.

Questions 1 through 6 of the RBDS (as tailored for this study) assess caregivers' perceptions of response-efficacy and self-efficacy toward using booster seats; questions 7 through 12 assess caregivers' perceived susceptibility to and severity of injury in motor vehicle crashes. Internal consistencies (α) were .82 (threat subscale) and .79 (efficacy subscale).

2.2.4. Behavioral observation apparatus

Systematic behavioral observations were conducted weekly at each site to observe any changes in occupant protection practices. A "clicker-board" was designed by the research team to collect these data. The clicker-board was composed of 12 tally counters mounted to a masonite board and divided into four quadrants (see Fig. 1). Three of the quadrants were used to record data for specific age groups (infant/toddler, booster-size, or belt-size), while the fourth quadrant was used to record a child's location in the car (front seat or back seat). Each tally counter was labeled and used to record data for a specific type of observation made (i.e., unrestrained, riding in the back seat, etc.).

For each child being driven into a school site, the researcher first determined the size category of the child by distinguishing if the child was: (a) infant/toddler weight/age (birth to about age 4; less than approximately 36 in. and 40 lbs.); (b) booster weight/age (approximately 4–8 years, until about 4 ft 9 in. and 80 lbs.); or (c) safety-belt weight/age (over 4 ft 9 in. and over 80 lbs., over 8 years old on average). The researcher then recorded restraint use in the corresponding quadrant for the child's judged size. It is important to note that a child's overall approximate size is more important than age when determining appropriate seat use. Researchers received

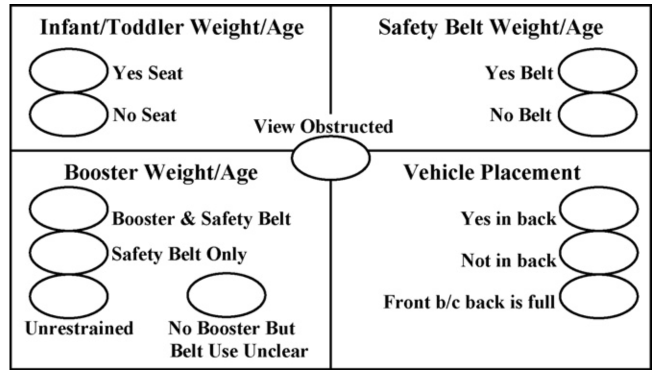

Fig. 1. Diagram of the behavioral observation apparatus.

extensive training to assist in judging children's ages and both research and experience indicate that age and size estimations in child passenger safety research can be accomplished with a great degree of validity and reliability (Moeller et al., 2002). Specifically, Moeller and colleagues stood at fast-food drive-thru areas and judged child occupants' ages as vehicles drove up to the drive-thru window ($N = 449$). After recording their judgments, researchers asked the driver for verification of the children's ages. When considering the percent of age assignments that were correct by age category (infant, toddler, school age, etc.), their judgments were 87.1% correct (Moeller et al., 2002).

When recording data on the clicker board, quadrant determination was based on the size of the child, not on the type of restraint used. Each child was recorded in only 1 of the 3 restraint use quadrants. Additionally, each child's front-seat or back-seat use was recorded in the Vehicle Placement quadrant. A twelfth tally counter in the center of the clicker board allowed for a tally of children whose restraint use could not be observed (e.g., tinted windows). At the end of the observation period, the researcher transferred the tally counter totals to a data sheet before entry into the database.

2.2.5. Informational brochure

Because the video only addressed occupant protection recommendations for booster-size children, an informational brochure ("Are You Using it Right?" from NHTSA, 2004) covering recommendations for all age ranges was distributed to all caregivers (at both control and intervention sites) immediately following participation in the study. As the research team was interested in evaluating the effects of the video alone, this brochure was also given to control participants during the same time frame that the treatment group received the video and brochure. In addition, both groups received the brochure after completing all (pre and post) surveys.

2.2.6. Incentives

To help encourage participation, small inducements (valued US$ 2.00 or less per person) were given to caregivers/families who participated in the study. Daycare staff were provided with tote bags and a gift basket to share.

2.3. Procedure

2.3.1. Design

The video-intervention was evaluated via an interrupted time series design (pre/post) with similar control sites for comparison. The study took place over 20 weeks; 9 weeks constituted the baseline phase and the remaining 11 weeks followed implementation of the video in the intervention sites. The comparison sites were "wait-listed" and were offered the intervention video following completion of the study.

2.3.2. Behavioral observations

Anonymous behavioral observations of children's occupant protection practices were conducted by unobtrusive researchers in study site parking lots. Data collectors used clicker boards to collect restraint use and vehicle placement data, as described above. Data collectors received extensive training to ensure they applied the same observation and recording procedures.

Specifically, in order to assist our data collectors in estimating age of children, visits were coordinated with area daycare facilities prior to data collection to observe children of various ages. After observing groups of children of known ages in their classes, research assistants were better able to judge children's ages. Because age is only one aspect determining recommended restraint use, researchers considered the combination of multiple factors, including height, weight, overall size, facial features, and hairstyle to discriminate children's ages. Researchers also received several weeks of training regarding best practices in child occupant protection, including size recommendations for specific seat types. Finally, researchers spent a month practicing use of the clicker board while paired with an experienced observer at non-study sites (collecting practice data). Researchers were not permitted to collect data until at least 90% reliability was reached when paired with an experienced observer. To ensure reliability monitoring throughout the study, two researchers independently observed the same individuals for 13% of all sessions.

Behavioral observations took place for a total of 20 weeks, with 9 weeks for baseline and 11 weeks for intervention follow-up. Daycare site scheduling preferences did not allow for equal durations for baseline and intervention follow-up. All child passengers being dropped off at the centers in the morning between 7:00 and 8:30 a.m. were recorded anonymously. Observers' presence was kept as unobtrusive as possible, was unannounced, and the reason for our presence was only explained when specifically asked by caregivers (observations were of public behavior, thus, informed consent for anonymous observations was not required). Drop-off times were used for observations in order to capitalize on the element of surprise. That is, during drop-off times children were already traveling in their cars when they arrived at the site and thus it was too late to change occupant protection practices by the time they noticed the researchers (if they noticed at all). A modified Latin-square design was used to schedule observation days across sites; each site was observed one day per week and caregivers were unaware which days were observation days.

Behavioral data were repeatedly assessed throughout both phases (pre–post) of the study to allow for time series graphing of risky and safe rides at control and intervention sites. The clicker board totals provided the research team with percent totals for every observation period (1 period per day/site). These safe/at-risk percentages were analyzed for the existence of trends in serially dependent time-series data. These data provided the necessary information for calculating dependent measures for restraint use and vehicle placement, including percentage of age-appropriate children using belts, riding in safety seats, riding in booster seats, and riding in the back seats of vehicles.

2.3.3. Survey and video administration

The 6-min *Boost 'em in the Back Seat* video was offered for viewing during pick-up times (3:00 p.m. to 6:00 p.m.) at participating after-school/daycare programs. Following flyer announcements, research assistants were positioned in the lobbies of participating sites for 1 week per site. At intervention sites, interested caregivers gave informed consent, completed the KIKS and RBDS pre-surveys, a demographic questionnaire, and watched the video (individually or in groups of 2–3 people) on a television or computer screen. Immediately following the video, participants completed the KIKS and RBDS post-surveys, entered the raffle to win a gift certificate, received the informational brochure, and received a small toy for their child. Despite the limitations inherent in having only a 6-min delay between pre and post surveys, immediacy was critical to evaluate whether it was the video only that altered knowledge (e.g., otherwise participants whose interest was peaked could seek additional information by, for instance, consulting the Internet). The authors felt a non-immediate post-survey would risk contamination. It is also important to note that the informational brochure mentioned above was provided to both control and intervention groups and was only given *after* completion of all surveys for additional take-home reading material.

At wait-list control sites, participants gave informed consent, completed the KIKS and RBDS pre-surveys, a demographic questionnaire, entered the raffle to win a gift certificate, were given the informational brochure (which the intervention group received as well), and received a small toy for their child. Only pre-data were available from the control participants because asking parents to fill out an identical survey again after only 6 min had passed with no interim intervention was simply not practical in the field setting. Once all data collection efforts were completed, researchers returned to the control sites to allow caregivers a chance to view the video.

3. Results

Overall, the video was well-received by caregivers. Ninety-nine percent of participants thought that every parent of a young school-age child should see the video and 86% of participants stated that they learned a lot from the video. Further, the study's results supported the hypotheses and indicated that the video program was successful, as discussed below.

3.1. Knowledge and attitude ratings

After correcting for problems with alpha inflation by setting alpha to .017 using Bonferroni's correction method, *t*-tests were used to analyze planned comparisons for group and phase. A 2×2 factorial ANOVA could not be performed because only pre-data were available from the control group. Compared to baseline and control assessments (which were equivalent as expected, $t(217) = 1.22$, n.s., $\eta^2 = .01$), the treatment groups' ($N = 100$) child passenger safety knowledge, risk-reduction attitudes, and behavioral intentions related to booster-seat and back-seat use increased significantly from KIKS pre-test ($M = 98.6$) to post-test ($M = 116.2$), $t(99) = 12.25$, $p < .001$, $\eta^2 = .41$. For instance, KIKS surveys indicated that parents learned that the seat belt does not provide the same protection as a booster seat and that children should remain in a booster seat until approximately 80 lbs. Parents also learned that booster seats are recommended for most 7-year-olds. Compared to baseline and control conditions, parents exposed to the video reported having less favorable attitudes toward children traveling in the front vehicle seat, felt more comfortable with booster-seat installation, were more confident about getting their children to ride in boosters, and perceived cost to be less of a barrier.

A series of repeated measures ANOVAs were run on the pre–post KIKS survey data for the intervention group to explore whether the intervention had a differential effect on various demographic groupings. These analyses were not significant for gender, $F(2, 94) = 0.024$, n.s., $\eta^2 = .001$; ethnicity/race (black, white, or other),

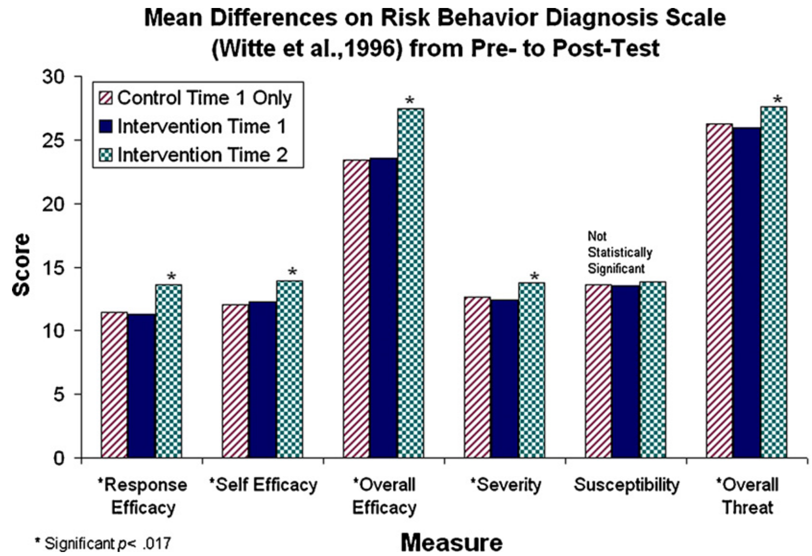

Fig. 2. Increase in perceived efficacy and threat from time 1 to time 2.

$F(2, 94) = 2.54$, n.s., $\eta^2 = .05$; socio-economic status, $F(5, 91) = 0.76$, n.s., $\eta^2 = .04$; or education level, $F(4, 92) = 0.37$, n.s., $\eta^2 = .02$.

3.2. Fear and efficacy ratings

The video's threat and efficacy components were evaluated using the RBDS (Witte et al., 1996). After correcting for problems with alpha inflation by setting alpha to .017 using Bonferroni's correction method, *t*-tests were used to analyze planned comparisons for group and phase. Compared to control and baseline levels of threat (which were equivalent as expected, $t(218) = 0.72$, n.s., $\eta^2 = .00$), the video significantly increased parents' overall sense of threat related to the hazard from pre-test ($M = 25.9$) to post-test ($M = 27.6$), $t(99) = 4.64$, $p < .001$, $\eta^2 = .10$ (see Fig. 2). Regarding parents' threat ratings, perceived severity increased while susceptibility did not; this was possibly due to the large number of participants (37% and 39% of the intervention and control groups, respectively) who did not have 4–8-year-old children.

Compared to control sites and baseline levels of efficacy (which were equivalent as expected, $t(218) = 0.19$, n.s., $\eta^2 = .00$), the video significantly increased parents' sense of efficacy related to the recommended behaviors (including response-efficacy and self-efficacy) from pre-test ($M = 23.6$) to post-test ($M = 27.5$), $t(99) = 8.08$, $p < .001$, $\eta^2 = .25$ (see Fig. 2).

A series of repeated measures ANOVAs were run on the pre–post RBDS ratings for the intervention group to explore whether the intervention had a differential effect on various demographic groupings. These analyses were not significant for gender, $F(2, 95) = 0.23$, n.s., $\eta^2 = .005$; ethnicity/race (black, white, or other), $F(2, 95) = 1.18$, n.s., $\eta^2 = .02$; socio-economic status, $F(5, 92) = 0.31$, n.s., $\eta^2 = .02$; or education level, $F(4, 93) = 0.54$, n.s., $\eta^2 = .02$.

3.3. Restraint use and vehicle placement observations

Researchers conducted 3382 (1925 intervention and 1457 control) anonymous occupant safety observations of children in parking lots of participating sites over 20 weeks. Because parking lot observations were anonymous, it is possible that some observations at intervention sites were of individuals who, although attending an intervention daycare, did not see the video.

The *C*-statistic (Tryon, 1982) was used to evaluate differences in behavioral observations among sites and phases. The *C*-statistic is warranted for analyzing trends when the series does not contain enough data points (50–100) for auto-regressive integrated moving average (ARIMA) procedures (Tryon, 1982). The *C*-statistic requires only 8 data points per phase to analyze trends. Although there were 3382 individual observations of children, these data were essentially yes and no for whether or not the child was restrained appropriately. Thus, these data were aggregated into percent use by day to allow for analysis of trends using the *C*-statistic.

3.3.1. Reliability ratings

Two observers simultaneously collected data for 13% of the observation days in order to determine inter-rater reliability, which was calculated using two methods. The first method followed a standard inter-rater reliability formula: the number of observations that both researchers agreed upon, divided by the total number of agreements plus disagreements. All inter-rater reliability values were excellent, at or above .90. A more conservative measure that corrects for chance agreement, Cohen's Kappa, was also computed. According to Fleiss (Fleiss, 1981), Kappa values of above .40 are acceptable. All Kappa reliability values were in the excellent range, at or above .75.

3.3.2. Restraint use observations

The *C*-statistic (Tryon, 1982) was computed to evaluate the presence of trend changes due to the intervention in serially dependent time series observation data. During the baseline phase (36 observation days completed over 9 weeks) the data were tested to observe the presence of any trends for overall restraint use and booster-seat use at intervention sites compared to control sites. Overall restraint-use trends take into account restraint use of all children observed (infants, toddlers, booster, and belt-sized children), whereas booster-seat use trends only include restraint use for observed booster-aged children.

As expected, the resulting *C*-statistic indicated the absence of any trends during baseline for overall restraint use ($Z = 0.34$, n.s. for the intervention group and $Z = 1.00$, n.s. for the control group) and for booster-seat use ($Z = -0.10$, n.s. for the intervention group and $Z = -1.04$, n.s. for the control group). This confirmed that the baseline was stable prior to intervention. Means for daily percent booster-seat use for booster-sized children during Phase 1 were 30.4% and 35.8% for the intervention and control groups, respectively. Means for daily percent overall restraint use (as appropriate

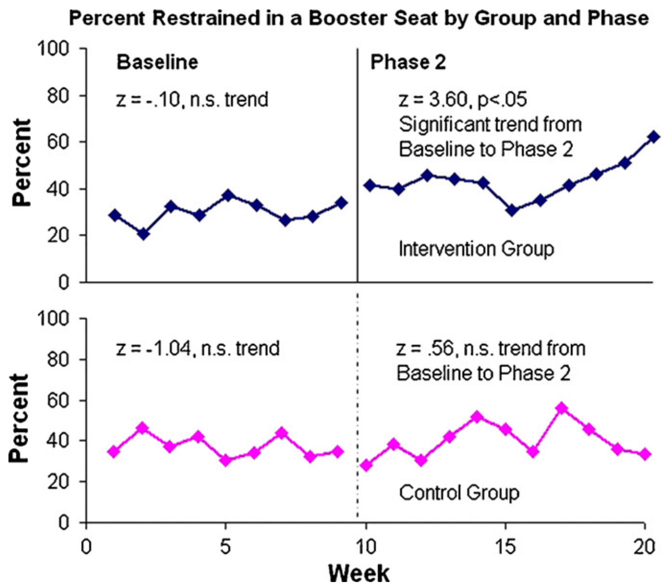

Fig. 3. Booster seat use trends for children aged 4–8.

for age/size) for all children observed during Phase 1 were 52.2% and 64.4% for the intervention and control groups, respectively.

During the intervention phase (44 observation days over 11 weeks), the video intervention was implemented in intervention sites and resulted in the appearance of a significant upward trend in both restraint use and booster-seat use for the intervention sites (see Figures 3 and 4). The analysis of observed restraint use across the 20 observation weeks (baseline + Phase 2) at intervention sites confirmed the visual evidence of a significant upward trend following the intervention for overall restraint use ($Z = 2.60$, $p < .05$) and for booster-seat use ($Z = 3.60$, $p < .05$). Comparison sites did not show a significant trend change from baseline to Phase 2 (20 observation weeks) for either overall restraint use, $Z = .75$, n.s., or booster-seat use, $Z = .56$, n.s. These analyses confirmed that, as hypothesized,

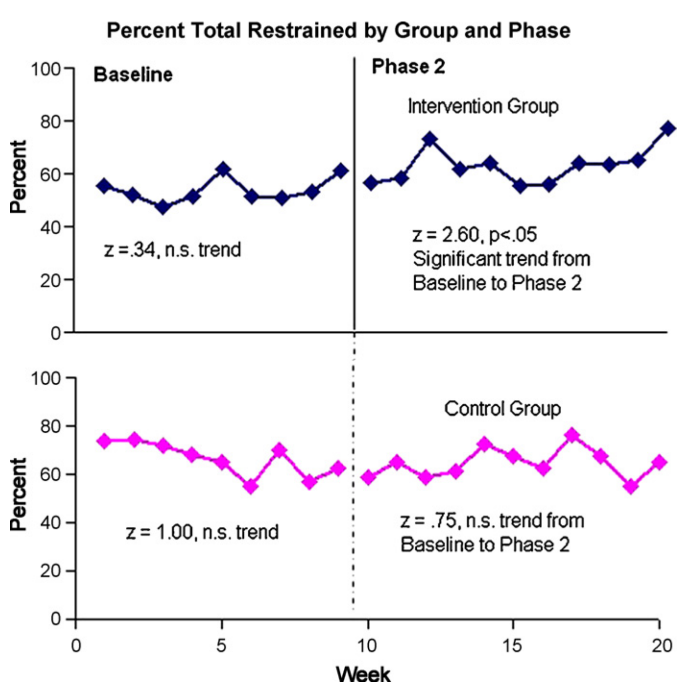

Fig. 4. Overall restraint use trends for children less than 13 years old.

there were significant increases in observed overall restraint use and booster-seat use following exposure to the intervention video compared to both baseline and to control sites. Means for daily percent booster-seat use during Phase 2 were 35.2% and 28.6% for the intervention and control groups, respectively. Means for daily percent overall restraint use were 60.1% and 68.4% for the intervention and control groups, respectively. In summary, at intervention sites the video-intervention resulted in a 16% increase in booster-seat use over baseline level (given the 4.8 percentage-point increase from 30.4% to 35.2%), and a 15% increase in overall restraint use over baseline level (given the 7.9 percentage-point increase from 52.2% to 60.1%).

3.3.3. Vehicle placement observations

C-statistic analyses of observed rear-seat use indicated the absence of any significant trends from baseline to Phase 2 for either the intervention ($Z = .47$, n.s.) or control groups ($Z = .08$, n.s.). This is potentially due to ceiling effects, as mean rear-seat use at baseline was 92.2% for the intervention group and 94.1% for the control group. During Phase 2, mean rear-seat use was 92.5% and 93.9% for the intervention and control groups, respectively.

4. Discussion

This quasi-experimental pilot study tested the use of a high-threat message to increase booster-seat use. Results support the effectiveness of the program, with significant improvements in knowledge, attitudes, fear, efficacy, and observed safety behavior following exposure to the video. Although no changes were noted regarding rear-seat use (possibly due to ceiling effects), the intervention resulted in a 16% increase in booster-seat use over baseline level and a 15% increase in overall restraint use over baseline level. It is interesting that the video intervention had an effect on the restraint use of all ages, not just that of booster-age children. This finding is perplexing and requires additional research, but is perhaps due to the video's portrayal of messages of high-threat consequences (without gore) to motivate action and increase perception of risk related to the hazard. For instance, the video includes images that evoke high emotion, portrays a family experiencing a crash and its aftermath, and uses crash-test footage and computer-generated simulations to portray the power of crash forces. It is possible that the crash content of the video, while not intended for parents of children of all ages, motivated all parents to take extra care to ensure they were restraining all of their children properly.

4.1. Limitations

This quasi-experimental study recruited volunteer participants in daycare settings in southeastern Virginia, and thus may not be generalizable to all demographic groupings. Also, while after-school/daycare settings were ideal for ready access to parents for surveys and parking-lot observations (as they drop off and pick up their children daily), the numbers of children age 6 and older (the age when most Virginia children are graduated to adult safety belts) were limited by the nature of the setting. Of the 100 parents who viewed the intervention video, only 63 of these participants had children within the 4–8 year-old range. Evaluation of the video in Kindergarten and 1st Grade elementary school settings would be a better venue to ensure that a larger number of participants will be parents of 4, 5, 6, and 7 year-olds; however, because most children are bused to school, parking lot observations will be a challenge.

Although preliminary data support the video's efficacy, additional empirical evidence is needed to support the use of threat appeals in booster-seat interventions. This study was limited in both scope and length. Following this promising pilot study, a group-randomized trial which accounts for clustering of participants within settings and is a true factorial design is an appropriate next step. Further, it would be ideal to include a long-term follow-up of self-reported knowledge and observed behavioral changes. Most importantly, for a complete understanding of the effects of video, the video should be compared to an information-only comparison (as opposed to the no-treatment control used in this study). This additional comparison would permit teasing apart the effects of fear and efficacy separately from the effects of information and education.

4.2. Conclusions

The *Boost 'em in the Back Seat Safe Ride Program* is thought to be the first intervention of its kind, as no other child passenger safety programs are known that specifically target an increase in caregivers' perception of vulnerability to motor vehicle injury to their children. The results of this pilot study support the use of this high-threat message to increase booster-seat use, with significant improvements in knowledge, attitudes, fear, efficacy, and an observed 16% increase in booster-seat use over baseline level. Moreover, the intervention may generalize to various demographic groupings, as no differences were found according to gender, ethnicity/race, socio-economic status, or education level. Thus, the application of high-threat messages to child passenger safety is promising, and these techniques have the potential to be adapted to other health risk areas.

As interventionists struggle to reach the remaining 59% of parents who do not restrain their booster-age children appropriately, it is important that we consider parents' points of view and the challenges presented by them. Advocates must bear in mind that their intervention must compete and combat many parental biases, including but not limited to: (a) low perceived risk regarding crash injury; (b) disbelief in the effectiveness of booster seats versus safety belts; (c) poor understanding of the power of crash forces; (d) poor confidence in their ability to get their children to use a booster seat; (e) situational barriers to the adoption of booster seats (e.g., cost, child conflict); (f) confusions contributed by legal loopholes; and (g) the pressures of social influence stemming from nonuse being normative. Considering all of these factors (and more), it seems necessary that the field revisit the literature on effective risk communication and work to design child safety campaigns to better target the unmotivated parent, combat their inherent biases, and motivate *action*.

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