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Promoting Use of Booster Seats in Rural Areas Through Community Sports Programs

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Abstract

Background—Booster seats reduce mortality and morbidity for young children in car crashes, but use is low, particularly in rural areas. This study targeted rural communities in 4 states using a community sports-based approach.

Objective—The Strike Out Child Passenger Injury (Strike Out) intervention incorporated education about booster seat use in children ages 4–7 years within instructional baseball programs. We tested the effectiveness of Strike Out in increasing correct restraint use among participating children.

Methods—Twenty communities with similar demographics from 4 states participated in a non-randomized, controlled trial. Surveys of restraint use were conducted before and after baseball season. Intervention communities received tailored education and parents had direct consultation on booster seat use. Control communities received only brochures.

Results—1,014 pre-intervention observation surveys for children ages 4–7 years (Intervention Group (I): N = 511, Control (C): N = 503) and 761 post-intervention surveys (I: N = 409, C: N = 352) were obtained. For 3 of 4 states, the intervention resulted in increases in recommended child restraint use (Alabama +15.5%, Arkansas +16.1%, Illinois +11.0%). Communities in one state (Indiana) did not have a positive response (−9.2%). Overall, unadjusted restraint use increased 10.2% in intervention and 1.7% in control communities (P =.02). After adjustment for each state

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in the study, booster seat use was increased in intervention communities (Cochran-Mantel-Haenszel OR 1.56, 95% CI (1.16–2.10)).

Conclusions—A tailored intervention using baseball programs increased appropriate restraint use among targeted rural children overall and in 3 of 4 states studied. Such interventions hold promise for expansion into other sports and populations.

Keywords

children; injury; motor vehicles; rural

Motor vehicle injury is the leading cause of injury death for children 4 to 7 years of age in the United States. Booster seat use in this age group reduces the risk of injury by 59%, but despite this, most of these children are currently either unrestrained or using seatbelts designed for adults[1] and 78% of drivers report improper use of either the shoulder or lap belt by this age group.[2] The American Academy of Pediatrics (AAP) and the National Highway Traffic Safety Administration (NHTSA) recommend that children should ride in a forward-facing car seat with a 5-point harness until the children have completely outgrown the manufacturer's height and weight limits, typically around 4 years of age. At that point, the recommendations state that children should be restrained in a booster seat and lap-shoulder seat belt until they fit properly in adult seatbelts, which is typically at least age 8, about 80 pounds, or a height of 4 foot 9 inches.[3] Many parents are unaware that a booster seat offers optimal protection for these children [4–6] and that booster seat use substantially reduces the risk of life-threatening spinal, abdominal, and/or head injuries associated with use of an adult seatbelt or lap belt alone.[7–10] Factors contributing to lack of booster seat use included confusion over terminology and seat designs, incomplete understanding of the technology, and distrust of potential performance of the booster seats.[11]

Trauma mortality, especially for motor vehicle crashes, is disproportionately higher in rural areas. [12] Motor vehicle crashes in rural areas account for 60% of all traffic fatalities, but less than 40% of vehicle miles traveled.[13] Crashes in rural areas tend to be more severe and involve ejection from the vehicle more frequently. Clark found that mortality due to motor vehicle crashes was higher in communities with populations <25,000 and was inversely proportional to population density of the county, even after controlling for other factors such as driver age, restraint use, and vehicle speed.[14] Speed is cited as a contributing factor on rural roads due to the decreased presence of traffic control devices.[15] Differences in design of rural roads also contribute to increased risk.[16,17] Rural drivers perceive less danger in not using seatbelts than urban drivers,[18] and child restraint use also tends to be lower in crashes occurring in rural communities compared to urban settings.[19] While numerous studies aimed to increase the use of child passenger seats, including booster seats, among low-income and minority children, few of the methods proposed were tested in rural communities and to our knowledge none were specifically tailored to engage this population.[20]

Environmental and demographic differences that increase behavioral risk factors, along with availability of resources, suggest that prevention strategies developed for urban populations may not translate well to rural populations. Strategies to increase motor vehicle safety that rely more on local resources than traditional public agencies may be better suited for rural communities due to greater mistrust of governmental interventions among rural residents.[18]

The *Strike Out Child Passenger Injury* (Strike Out) intervention uses instructional baseball programs, frequently referred to as "T-ball," for children ages 4–7 years as a setting for education of parents regarding the importance of using booster seats. T-ball is a community-supported activity in rural areas that bridges gender, ethnic, and socioeconomic divisions which may be present in other community activities. One recent study suggested that parents are more likely to use booster seats when both personal decision-making factors (ie, perceived benefit of booster seat use and reduced barriers to access) and social norms are addressed.[21] Additionally, because parents typically serve as coaches and the activity is a common gathering point for families with children in the booster seat age group, we believe instructional baseball programs may provide peer-level social influence that may elevate motor vehicle safety for children as a community health priority. We report on the effectiveness of the intervention in increasing the proportion of target age children who were appropriately restrained.

METHODS

The Strike Out model consists of a carefully planned sequence of educational and dissemination strategies grounded in behavioral theories. Implemented in a community sports context, the intervention includes booster seat promotion by local champions, coalition development, capacity building, media, and direct education. Social marketing techniques of Kotler and Anderson were applied in the initial development and evaluation of the intervention.[22] The diffusion of innovation model[23,24] was applied to explain the adoption of booster seat use as a community norm through multiple social systems (eg, health improvement coalitions, civic leaders, media, and baseball coaches). Consumer Information Processing model[25] was used to frame and promote booster seat use in a way that parents could readily draw conclusions about the importance of appropriate restraint selection and use. All materials developed for the program were tailored to reflect the baseball theme and to focus on using communication through the weekly local newspapers and community groups common in smaller communities.

Setting

Members of the Injury Free Coalition for Kids (IFCK) program were partners in the Strike Out program. IFCK is a children's hospital-community partnership model in which local and regional data are used to direct injury prevention programs and research.[26,27] At the time of the Strike Out intervention, 44 hospitals in 40 cities across the United States were included in the IFCK network. The originating study site in Arkansas sent out a call for interest in collaborating on the study, including a summary of the model, study design, and resources required, through the IFCK network listserv. A subsequent conference call was conducted with interested sites to further discuss the study design and availability of resources. In total, 8 IFCK sites expressed interest and 3 sites (Alabama, Illinois, and Indiana) were selected because of their access to rural communities and comparability to Arkansas's rural populations.

Strike Out was conducted as a non-randomized, community-controlled trial with the primary aim of demonstrating the effectiveness of the intervention in increasing the proportion of children in the target age group (4–7 years) that were appropriately restrained based on their age and size. To ensure as much homogeneity among intervention and control community sites as possible, several important criteria were considered. Participation was restricted to communities designated by the US Bureau of the Census as small town or defined rural communities. All participating communities shared similar demographic criteria to ensure instructional ball programs of comparable size, including: 1) a minimum of 180 children between ages 5 and 9 years and 2) at least 30% of community households with children under age 18. Participating communities were also low-income, as demonstrated by: 1) approximately 50% of school-age children qualified for free and reduced lunch programs, 2) median household incomes of approximately $35,000 annually, 3) approximately 20% of adults without a high school education, and 4) approximately 30% of families with children <5 years living in poverty. Communities that had substantial previous exposure to booster seat education through community-wide education or coalition activities were excluded. Table 1 shows the number of observations obtained in the participating communities. Two Arkansas communities and one Illinois community participated as control communities in one baseball season and as intervention sites in a subsequent season.

Intervention

Strike Out proceeded according to the model represented in Figure 1. The intervention communities received capacity building in the form of training of child passenger safety (CPS) technicians prior to the start of the T-ball season. Presentations were made to local civic groups, key informants, and baseball program leaders and coaches early in the baseball season to generate community support. In a compressed 4- to 6-week period during the baseball season, a series of educational measures were provided in the communities. First, parents received a letter from the team coaches encouraging booster seat use that was accompanied by a baseball-themed educational brochure. In addition, a series of articles on benefits of booster seat use with endorsements by local spokespersons ran in the local weekly newspapers. The intervention culminated with a child passenger safety checkup event conducted concurrently with a T-ball activity in each intervention community. This allowed for personalized evaluation of the booster or car seat needs of the participating children and their siblings. Participation was encouraged by coaches, who accommodated the activity by allowing team members to leave the game and return following completion of the car seat check. During the checkups, parents were provided with one-on-one education with the certified CPS technicians previously trained within the community. Car seats and booster seats were provided at no cost to families when required. Finally, a baseball-themed toy with a buckle-up message was provided to participants, serving as an incentive for reluctant families. In control communities, families received only an explanatory flyer about the study that was distributed at the time the surveys were conducted. These families also received a short brochure on child passenger safety developed by the study team and based on national best practice recommendations from the American Academy of Pediatrics (AAP).[3]

Measurement

Appropriate restraint use was determined using the best practice standards of the AAP. Surveys of restraint use were conducted in each of the intervention and control communities at the start of the baseball season and at the end of the season by community-specific volunteers under the supervision of study staff. All volunteers, who were mostly members of local civic groups, completed a 2-hour standardized training by study staff that included both a didactic review of motor vehicle safety and procedures, and an applied session on recognition of different types of restraints.

In both the intervention (I) and control (C) communities, the trained volunteers administered a survey to observe and record driver and passenger demographic data and restraint use. Drivers were asked the ages, weights, and heights of those in the vehicle, along with a short series of questions about their knowledge and awareness of motor vehicle safety. These voluntary, anonymous surveys typically took less than 1 minute to complete. Survey waves were conducted in parking areas during arrival periods prior to a baseball practice or game early in the season and prior to initiation of intervention activities in intervention communities. Surveys were repeated at a practice or game at the conclusion of the season, typically 4–6 weeks after intervention activities concluded. The use of local volunteers to conduct the observational interviews minimized the possibility of double-counting families as they were able to readily identify families by face and/or name. The raw data were forwarded to the study team for review for consistency and data entry, and a further 10% random audit of entries was conducted for quality control. Study procedures, including training, survey instruments, and data collection procedures, were similar to those used in previous studies of motor vehicle safety interventions.[28]

Statistical Analyses

Laws regarding age-appropriate seatbelt restraint differed between the 4 states included in the study. Consequently, all statistical analyses estimated the effect of the intervention within each state. Summary statistics for the anonymous survey data measured during baseline, pre-season (T1) and post-season (T2) assessments were estimated by state. Differences in categorical survey responses were analyzed using a Chi-Square ($\chi\chi^2$) test of independence for both T1 and T2 assessments.

Determining the effectiveness of the intervention on changing the number of children appropriately restrained according to AAP guidelines was tested using the Cochran-Mantel-Haenszel (CMH) test and a generalized linear mixed model (GLMM). A CMH test extends the standard 2x2 Chi-Square (χ^2) test of independence through the ability to stratify on a third variable. In this analysis, a CMH test estimated the intervention’s effect on AAP compliance between T1 and T2 assessments while stratifying by state (Alabama, Arkansas, Illinois, and Indiana).

Additionally, a GLMM was utilized to estimate the association of the intervention with proper AAP restraint of children aged 47. A GLMM is a multivariable regression in which state and survey data are modeled as explanatory variables. A GLMM can also estimate the variation “between” the intervention and control groups while accounting for the possible correlation of measurements “within” each community.[29,30] This statistical adjustment is of particular importance as multiple measurements were made within each community; moreover, while each community participating in the study was rural, any unobserved differences between the communities can be adjusted for using the GLMM. The strength of using the GLMM is that the overall effect of the intervention on the outcome can be estimated within each state while adjusting for the effect of the other explanatory variables as well as any unobserved community effect.

In this analysis, a GLMM associated the intervention’s effect with AAP compliance while controlling for state, baseline level of appropriate restraint use, and repeated measurements made within a community. Explanatory variables included in the GLMM were: state, age of target child, gender of target child, indicator of parent of target child driving the vehicle, indicator of driver restraint, and vehicle type. An underlying assumption in multiple regression models is that each explanatory variable is independent of the other explanatory variables. A variance inflation threshold of 2.5 was used in testing for multicollinearity (the actual dependency between explanatory variables) to determine which, if any, explanatory variable was associated with another explanatory variable and should be excluded from the model.[31,32]

The usage of several quality control mechanisms, including the training of all data collectors, data collection through a directed and brief interview, as well as quality control of all key data collected in the field, led to a dataset that was largely complete. However, even with these controls in place, there were a few variables with missing data. A sensitivity analysis was completed to demonstrate the differences between the “complete case” GLMM (excluding variables of driver restraint and vehicle type) and “all variable” GLMM (reduced sample due to missing data). All analyses were completed using Stata 12.1 (StataCorp LLP, College Station, Texas).

RESULTS

A total of 20 communities participated in this trial, leading to 1,775 observations on children aged 4–7 (1,014 pre-intervention (baseline or T1) and 761 post-intervention (T2)). Demographic, vehicle, and AAP compliance data are summarized for pre-intervention (Table 2) and post-intervention (Table 3) by state. Pre-intervention variables-age of child, gender of child, gender of driver, driver is parent of child, driver using restraint, and type of vehicle driven-were significantly different. Gender of driver was only recorded if the driver was the parent of the children in the car; otherwise, only the relationship of the driver to the child was recorded. To minimize the number of missing observations in the model, only parent as driver was included in outcome models. Arkansas had the highest proportion of trucks assessed (20.4%) and the lowest percentage of children appropriately restrained at both the pre-intervention and the post-intervention assessment (21.0% and 36.4%, respectively).

Figure 2 shows the changes in proportions of children restrained in each state. For 3 of 4 states, the intervention resulted in increases in recommended child restraint use (Alabama +15.5%, Arkansas +16.1%, Illinois +11.0%). Communities in one state (Indiana) did not have a positive response (-9.2%). Overall, unadjusted restraint use increased 10.2% in intervention and 1.7% in control communities (*P* = .02).

Appropriate restraint use using AAP criteria was further assessed at post-intervention, stratified by state using CMH. Those Arkansas communities in the intervention group were 4 times more likely than those in the control group to have properly restrained children (Odds Ratio = 3.99, 95% Confidence Interval (2.22, 7.19), *P* < .001). Arkansas was the only state to have a statistically significant effect (Alabama OR = 1.17, *P* = .603; Illinois OR = 1.23, *P* = .567; Indiana OR = 0.73, *P* = .317), although across all states the overall compliance was significantly improved by the intervention, with intervention communities being 1.56 times more likely than those in the control group to have properly restrained children (OR = 1.56, 95% CI (1.16, 2.10), *P* = .003).

The sensitivity analysis using both the “complete case” and “all variable” GLMMs are summarized in Table 4. Overall, the missing data contributed to a reduction of 3.3% in the overall sample between the complete case GLMM (n=1,775) vs the all variable GLMM (n=1,715). The “all variable” model is a GLMM with all explanatory variables; it was estimated using only 1,715 observations as data were missing for the variables *vehicle type* and *driver using restraint*. The “complete case” is a GLMM estimated without these 2 explanatory variables that used all 1,775 observations. The estimation of both models is reported as a measure of sensitivity, but the GLMM with all variables is considered the best model. Both of the GLMMs estimated a significant effect of the intervention in the state of Arkansas, where children in the intervention communities were more than twice as likely to be correctly restrained compared to those in control communities. The overall effect was less pronounced across the 4 participating states. Using the CMH approach, the intervention resulted in a 56% increased likelihood of correct restraint overall (Odds Ratio 1.56, 95% Confidence Interval (1.16, 2.10)); results demonstrated a strong trend toward improvement using other models but did not achieve statistical significance.

Other variables independent of intervention were also associated with compliance with best practices for restraint use. Younger children were more likely to be properly restrained compared to an older child, with odds ranging from 1.4 (4-year-olds vs 6-year-olds) to 2.3 (5-year-olds vs 7-year-olds). Correct restraint use was 1.7 times higher if the driver of the car was the parent of the child and 2.8 times higher if the driver was also restrained. Children transported in all car types (minivan, SUV, sedan) were more likely to be properly restrained than children in trucks, while the odds of compliance increased 1.6 times if the child was in a minivan as compared to a sedan.

DISCUSSION

Premature graduation to lap and/or shoulder belts is a leading reason for injury among restrained children in survivable crashes, and booster seat use reduces likelihood of death and prevents lap belt syndrome associated with lap and/or shoulder belts alone.[33–35] Booster seat use decreases with the age of the child, and overall use remains approximately 41% and has actually decreased slightly in recent years.[36,37] Variation in education and resources, road environment, and cultural and socioeconomic factors combine to contribute to the lack of optimal restraint and increased mortality risk for individuals in rural communities.[38,39] Practical factors including lower population density, higher costs, and a relative lack of trained personnel have resulted in few interventions focusing on the high-risk rural population.

Our study aimed to overcome these barriers to booster seat adoption in rural communities. Strike Out involved a convenient, culturally tailored, and highly efficient intervention designed to provide information and personalized child passenger safety education within a family activity and in a setting where relatively large numbers of target age children and families would be present. Grounded in behavioral theory and practical in its approach, Strike Out was able to reach rural families in fairly large numbers by building on an existing activity where children and their parents were already gathering.

The intervention demonstrated substantial short-term changes in child restraint practices. Strike Out appeared to be most effective in the state (Arkansas) with the lowest pre-intervention rates of booster seat use, and it may therefore be most successfully replicated in other rural areas where booster seat use is low. In 2 states where baseline booster seat use was greater, the increases in appropriate use approached but did not reach statistical significance. For reasons that are not clear, the small sample in one state (Indiana) did not respond to the intervention. The study also supports previous research which demonstrated that adults who wear seatbelts, parent compared to non-parent drivers, and drivers of minivans and sedans are more likely to restrain children correctly. Conversely, children in light trucks were much less likely to be restrained in booster seats, reinforcing the need for increased intervention and education in rural areas, where such vehicles are common.

The Strike Out intervention was well received in participating communities and was an impetus for sustained child passenger safety education in numerous communities. An implementation guide has been developed to aid in replication of the program. The guide includes step-by-step instructions based on the experience gained in the research project. This guide is being distributed to direct expansion of the program in interested communities in Arkansas. Other future directions of interest include expanding the sports-themed construct to include other team sports, such as soccer or football.

Several limitations should be noted in our study. First, the post-intervention surveys were conducted within a short time after the intervention activities were concluded, and therefore the longer-term effects of the intervention cannot be determined from the current study. Second, while the teams observed remained largely consistent during the season, no longitudinal individual measurements were made, and the results therefore reflect overall proportions of correctly restrained children observed in the communities. The 25% reduction in subjects from pre-intervention to post-intervention paralleled attrition in participation in the baseball programs that occurs over the course of the season as the school year ends and competing summer activities ensue. Unanticipated complicating factors (ie, severe weather, competing community interests) resulted in alterations of the planned sequence of Strike Out components in some communities, although every possible effort was made to not compromise the core components of the model. Finally, it is not known if comparable community engagement or effectiveness will be found in communities with different demographics, in urban settings, or when delivered through organized sports other than baseball.

CONCLUSIONS

A tailored intervention using baseball programs increased appropriate restraint use among rural children of booster seat age, both overall and in 3 of 4 states studied. Effects were most pronounced in the state with the lowest pre-intervention booster seat use. Such interventions hold promise for expansion into other sports and populations, particularly in rural areas with low adoption of booster seat technology.

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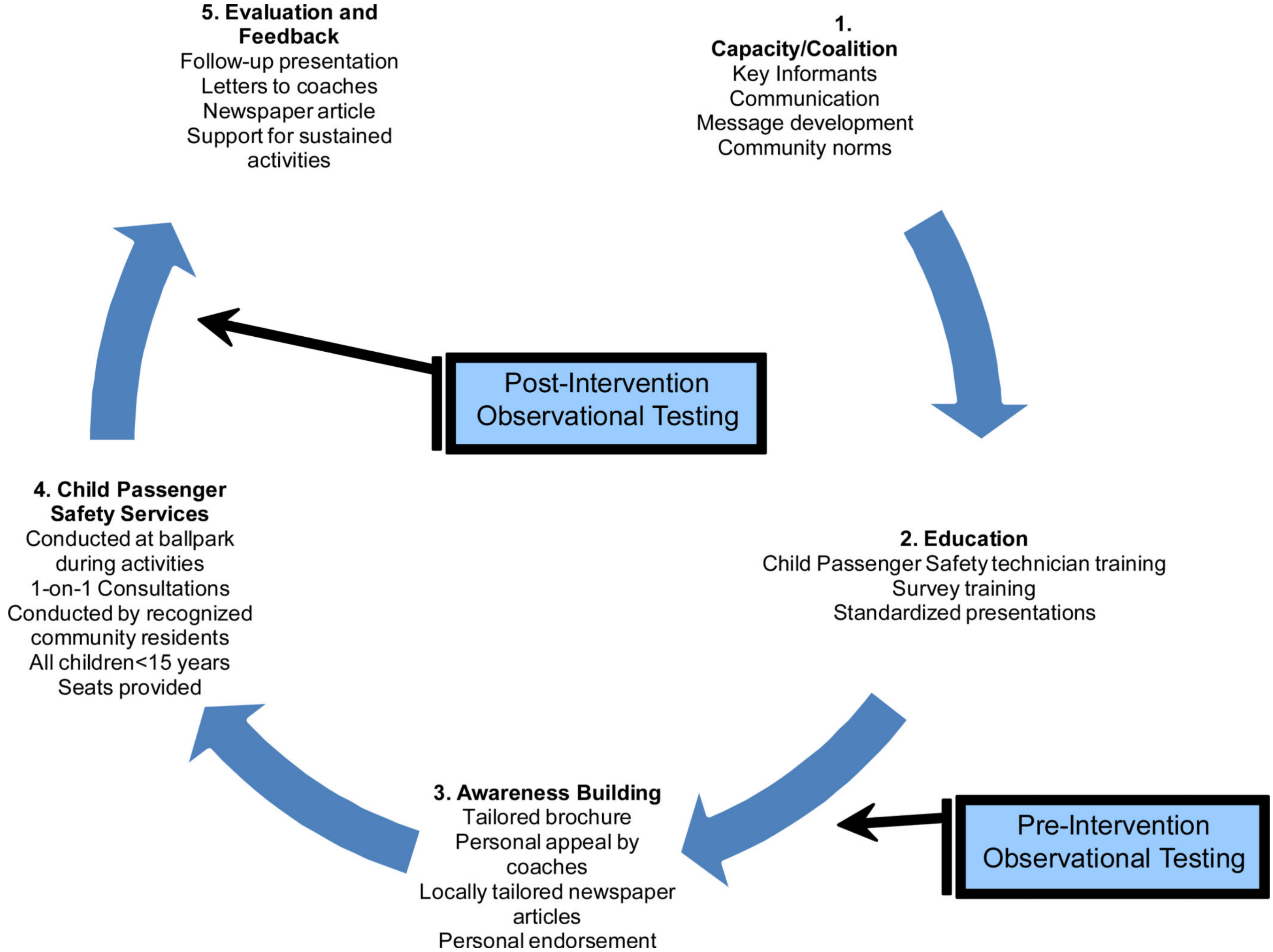

Figure 1.
Strike Out Child Passenger Injury Implementation Plan

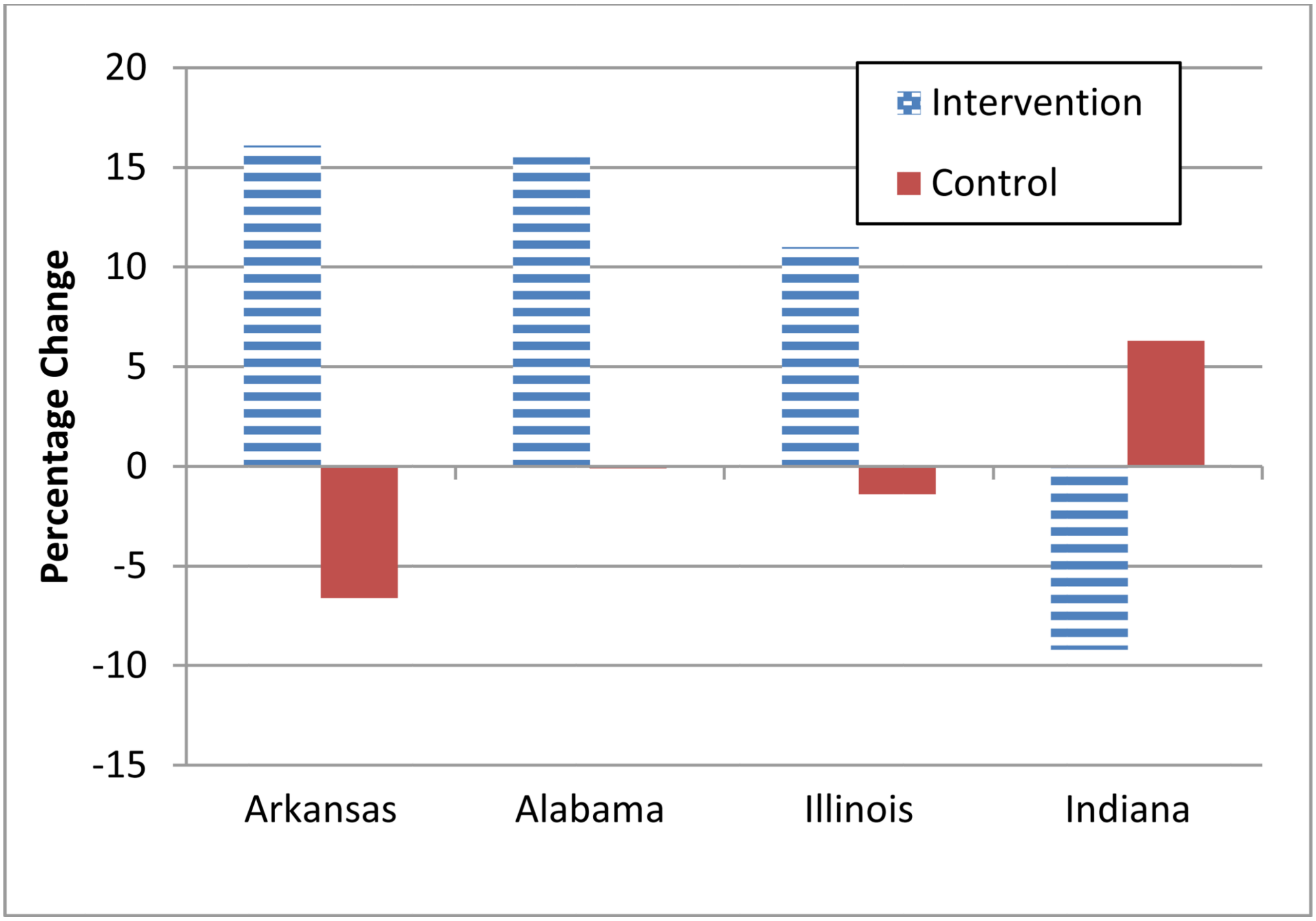

Figure 2.
Change in Appropriate Restraint Use, Intervention and Control Sites

Table 1

Study Participants by Group, Stratified by City and State

	City	Control	Intervention	Total
Alabama	Leeds	-	62 (6.7%)	62 (3.5%)
	Northport	99 (11.6%)	-	99 (5.6%)
	Prattville	-	113 (12.3%)	113 (6.4%)
	Shelby County	78 (9.1%)	-	78 (4.4%)
	Total	**177 (20.7%)**	**175 (19.0%)**	**352 (19.8%)**
Arkansas	Atkins	50 (5.9%)	-	50 (2.8%)
	Bald Knob	-	57 (6.2%)	57 (3.2%)
	Crossett	71 (8.3%)	-	71 (4.0%)
	Fordyce	55 (6.4%)	-	55 (3.1%)
	Heber Springs	-	76 (8.3%)	76 (4.3%)
	Malvern	-	105 (11.4%)	105 (5.9%)
	Monticello	-	50 (5.4%)	50 (2.8%)
	Morrilton	43 (5.0%)	46 (5.0%)	89 (5.0%)
	Stuttgart	94 (11.0%)	75 (8.2%)	169 (9.5%)
	Total	**313 (36.6%)**	**409 (44.5%)**	**722 (40.7%)**
Illinois	Canton	82 (9.6%)	-	82 (4.6%)
	Havana	102 (11.9%)	63 (6.9%)	165 (9.3%)
	Lewistown	-	66 (7.2%)	66 (3.7%)
	Total	**184 (21.5%)**	**129 (14.0%)**	**313 (17.6%)**
Indiana	Bedford	-	121 (13.2%)	121 (6.8%)
	New Carlisle	96 (11.2%)	-	96 (5.4%)
	Wakarusa	-	86 (9.4%)	86 (4.9%)
	Washington	85 (9.9%)	-	85 (4.8%)
	Total	**181 (21.2%)**	**207 (22.5%)**	**388 (21.9%)**
Total		**855 (48.2%)**	**920 (51.8%)**	**1775 (100%)**

Table 2

Summary of Pre-Intervention Assessment by State

		Alabama (N=172)		Arkansas (N=439)		Illinois (N=179)		Indiana (N=224)		
		Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	P[a]
N		85	87	201	238	110	69	107	117	
Age (years)[a]										**.035**
	4	27 (31.8%)	31 (35.6%)	41 (20.4%)	59 (24.8%)	19 (17.3%)	21 (30.4%)	24 (22.4%)	15 (12.8%)	
	5	14 (16.5%)	27 (31.0%)	66 (32.8%)	71 (29.8%)	32 (29.1%)	16 (23.2%)	43 (40.2%)	21 (17.9%)	
	6	22 (25.9%)	17 (19.5%)	45 (22.4%)	67 (28.2%)	35 (31.8%)	18 (26.1%)	30 (28.0%)	40 (34.2%)	
	7	22 (25.9%)	12 (13.8%)	49 (24.4%)	41 (17.2%)	24 (21.8%)	14 (20.3%)	10 (9.3%)	41 (35.0%)	
Weight (lbs)										.323
	< 20	0	0	0	0	0	0	0	1 (0.9%)	
	20 -< 40	10 (11.8%)	19 (21.8%)	25 (12.4%)	26 (10.9%)	13 (11.8%)	13 (18.8%)	19 (17.8%)	8 (6.8%)	
	40 -< 80	66 (77.6%)	58 (66.7%)	163 (81.1%)	177 (74.4%)	85 (77.3%)	49 (71.0%)	76 (71.0%)	87 (74.4%)	
	80+	0	3 (3.4%)	2 (1.0%)	9 (3.8%)	7 (6.4%)	1 (1.4%)	1 (0.9%)	8 (6.8%)	
Male Child		65 (76.5%)	66 (75.9%)	119 (59.2%)	139 (58.4%)	73 (66.4%)	42 (60.9%)	73 (68.2%)	88 (75.2%)	**<.001**
Parent Driver		76 (89.4%)	77 (88.5%)	171 (85.1%)	209 (87.8%)	98 (89.1%)	63 (91.3%)	98 (91.6%)	111 (94.9%)	.069
Female Parent		56 (65.9%)	53 (60.9%)	124 (61.7%)	156 (65.5%)	56 (50.9%)	44 (63.8%)	56 (52.3%)	46 (39.3%)	**<.001**
Driver Restrained		75 (88.2%)	83 (95.4%)	113 (56.2%)	152 (63.9%)	97 (88.2%)	58 (84.1%)	91 (85.0%)	94 (80.3%)	**<.001**
Vehicle Type										**<.001**
	Minivan	12 (14.1%)	8 (9.2%)	20 (10.0%)	19 (8.0%)	31 (28.2%)	13 (18.8%)	41 (38.3%)	17 (14.5%)	
	SUV	38 (44.7%)	27 (31.0%)	80 (39.8%)	94 (39.5%)	28 (25.5%)	31 (44.9%)	22 (20.6%)	42 (35.9%)	
	Sedan	15 (17.6%)	39 (44.8%)	54 (26.9%)	80 (33.6%)	30 (27.3%)	15 (21.7%)	24 (22.4%)	39 (33.3%)	
	Truck	15 (17.6%)	11 (12.6%)	47 (23.4%)	42 (17.6%)	20 (18.2%)	9 (13.0%)	14 (13.1%)	17 (14.5%)	
Appropriate Child Restraint		50 (58.8%)	41 (47.1%)	51 (25.4%)	76 (31.9%)	64 (58.2%)	35 (50.7%)	54 (50.5%)	68 (58.1%)	**<.001**

[a]Chi-Square test of independence testing difference in each variable between states ignoring group is reported.

Table 3

Summary of Post-Intervention Assessment by State

		Alabama (N=180)		Arkansas (N=283)		Illinois (N=134)		Indiana (N=164)		
		Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	p[a]
N		92	88	112	171	74	60	74	90	
Age (years)										**.040**
	4	34 (37.0%)	17 (19.3%)	24 (21.4%)	34 (19.9%)	8 (10.8%)	18 (30.0%)	21 (28.4%)	7 (7.8%)	
	5	17 (18.5%)	25 (28.4%)	30 (26.8%)	56 (32.7%)	22 (29.7%)	21 (35.0%)	27 (36.5%)	28 (31.1%)	
	6	23 (25.0%)	30 (34.1%)	38 (33.9%)	56 (32.7%)	28 (37.8%)	11 (18.3%)	21 (28.4%)	18 (20.0%)	
	7	18 (19.6%)	16 (18.2%)	20 (17.9%)	25 (14.6%)	16 (21.6%)	10 (16.7%)	5 (6.8%)	37 (41.1%)	
Weight (lbs)										.885
	< 20	1 (1.1%)	0	1 (0.9%)	2 (1.2%)	0	0	0	0	
	20 -< 40	13 (14.1%)	12 (13.6%)	11 (9.8%)	26 (15.2%)	5 (6.8%)	12 (20.0%)	22 (29.7%)	5 (5.6%)	
	40 -< 80	71 (77.2%)	69 (78.4%)	83 (74.1%)	137 (80.1%)	56 (75.7%)	42 (70.0%)	49 (66.2%)	75 (83.3%)	
	80+	1 (1.1%)	6 (6.8%)	6 (5.4%)	3 (1.8%)	3 (4.1%)	2 (3.3%)	2 (2.7%)	5 (5.6%)	
Male Child		66 (71.7%)	71 (80.7%)	70 (62.5%)	105 (61.4%)	52 (70.3%)	32 (53.3%)	43 (58.1%)	73 (81.1%)	**.006**
Parent Driver		89 (96.7%)	74 (84.1%)	99 (88.4%)	156 (91.2%)	68 (91.9%)	53 (88.3%)	63 (85.1%)	85 (94.4%)	.999
Female Parent		63 (68.5%)	57 (64.8%)	70 (62.5%)	123 (71.9%)	51 (68.9%)	42 (70.0%)	44 (59.5%)	51 (56.7%)	.053
Driver Restrained		87 (94.6%)	88 (100.0%)	68 (60.7%)	142 (83.0%)	65 (87.8%)	53 (88.3%)	58 (78.4%)	84 (93.3%)	**<.001**
Vehicle Type										**<.001**
	Minivan	11 (12.0%)	12 (13.6%)	2 (1.8%)	18 (10.5%)	21 (28.4%)	19 (31.7%)	25 (33.8%)	21 (23.3%)	
	SUV	49 (53.3%)	28 (31.8%)	33 (29.5%)	68 (39.8%)	14 (18.9%)	19 (31.7%)	16 (21.6%)	34 (37.8%)	
	Sedan	19 (20.7%)	38 (43.2%)	50 (44.6%)	51 (29.8%)	23 (31.1%)	14 (23.3%)	23 (31.1%)	21 (23.3%)	
	Truck	11 (12.0%)	9 (10.2%)	26 (23.2%)	33 (19.3%)	10 (13.5%)	8 (13.3%)	9 (12.2%)	14 (15.6%)	
Appropriate Child Restraint		54 (58.7%)	55 (62.5%)	21 (18.8%)	82 (48.0%)	42 (56.8%)	37 (61.7%)	42 (56.8%)	44 (48.9%)	**<.001**

[a] Chi-Square test of independence testing difference in each variable between states ignoring group is reported.

Table 4

Odds Ratios (95% Confidence Interval) of Children in Intervention Communities Meeting AAP Child Restraint Guidelines Estimated From Generalized Linear Mixed Models

		All Variables[a]	*P*	Complete Case[a]	*P*
N		1715		1775	
State[b]					
	Alabama	1.29 (0.50, 3.34)	.600	1.28 (0.45, 3.64)	.646
	Arkansas	2.46 (1.27, 4.76)	**.007**	3.09 (1.61, 5.92)	**.001**
	Illinois	1.12 (0.48, 2.60)	.799	1.01 (0.45, 2.27)	.985
	Indiana	0.82 (0.31, 2.20)	.695	0.99 (0.34, 2.89)	.990
Age					
	4 vs 5	0.91 (0.68, 1.23)	.544	0.94 (0.70, 1.25)	.668
	4 vs 6	1.37 (1.01, 1.86)	**.043**	1.34 (1.00, 1.80)	**.049**
	4 vs 7	2.13 (1.52, 2.98)	**<.001**	2.03 (1.47, 2.81)	**<.001**
	5 vs 6	1.50 (1.13, 1.99)	**.005**	1.43 (1.09, 1.87)	**.009**
	5 vs 7	2.33 (1.70, 3.20)	**<.001**	2.17 (1.60, 2.94)	**<.001**
	6 vs 7	1.55 (1.13, 2.13)	**.006**	1.52 (1.12, 2.05)	**.007**
Male Child		1.06 (0.85, 1.34)	.595	0.96 (0.77, 1.20)	.719
Parent Driver		1.70 (1.18, 2.44)	**.004**	1.89 (1.34, 2.68)	**<.001**
Driver Restrained		2.83 (2.05, 3.93)	**<.001**	-	-
Car Type					
	Minivan vs SUV	1.25 (0.90, 1.72)	.182	-	-
	Minivan vs Sedan	1.59 (1.14, 2.21)	**.006**	-	-
	Minivan vs Truck	2.61 (1.78, 3.84)	**<.001**	-	-
	SUV vs Sedan	1.27 (0.98, 1.65)	.069	-	-
	SUV vs Truck	2.10 (1.51, 2.91)	**<.001**	-	-
	Sedan vs Truck	1.65 (1.18, 2.30)	**.004**	-	-

[a] Odds Ratios (95% Confidence Intervals) reported.

[b] Odds Ratio of Appropriate Child Restraint of Intervention vs Control at Post-Season (T2) for each State reported.

Note: Explanatory variables included in the GLMM were: state, age of target child, gender of target child, an indicator of parent of target child driving the vehicle, and in the all variable model only, an indicator of driver restraint and vehicle type.