ALCOHOL DRUGS AND DRIVING

Volume 5 Number 1
January–March 1989

Alcohol, Drugs and Driving

Volume 5, Number 1

The Social Psychology of Risky Driving

Proceedings of an International Symposium held in Santa Monica, California

Richard Jessor, Ph.D., Chairman

April 28–May 1, 1988

Herbert Moskowitz, Ph.D.
Editor

Alcohol Information Service
a division of the
Brain Information Service
University of California

Los Angeles

1989

VOLUME 5, NUMBER 1 JANUARY–MARCH, 1989

ALCOHOL, DRUGS AND DRIVING

Contents

(continued on the following page)

116881

Intervening to Increase Children's Use of Safety Belts

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ABSTRACT

The safety belt use of children and adults was observed at three community sites (a Montessori school, skating rink, and fast food restaurant) immediately before and after the Virginia belt use law (BUL). At each location, safety belt use by both children and adults increased significantly, but only remained at record high levels at the school where a safety belt education program had been implemented before the BUL. This intervention program involved preschool children playing roles in a safety belt skit. Not only did these active participants increase their belt use after the skit, but after watching the play, primary school children and the parents of the preschoolers increased their use of safety belts significantly. Follow-up research during a summer recreational program at three schools compared three different reward contingencies added to five 30-minute participative educational sessions designed to motivate children to buckle up. At one school, 34 children were rewarded for being buckled up in their vehicles after the intervention activity; at another school, 26 children received the same rewards for participating in the educational program; and at the third school, 28 children received these prizes at the start of each program, without any stated response contingency. The children rewarded for program participation scored significantly higher on participation indices, but the rewards for safety belt use did not increase the beneficial effects of the educational programs, which were significant for both children and their parents. By recording vehicle license plate numbers, we were able to pair children with their parents and identify these pairs at another community site (i.e., the drive-through area of a fast food restaurant, where program participants redeemed coupons for free meals). With this procedure, we showed immediate generalization effects of the interventions, but no long-term maintenance of the target response.

Another study evaluated a safety belt campaign that targeted children and parents at three community swimming pools. This lifeguard-delivered program involved the signing of "buckle-up promise cards" that could be displayed in vehicles as a reminder of a personal commitment to use a safety belt. Advantages of including direct rewards for safety belt use were shown. Thus, in some situations, adding extrinsic rewards to a safety belt program for children may not be beneficial, perhaps even detrimental, whereas in other circumstances buckle-up rewards are apparently useful. This important issue is discussed from both a theoretical and empirical perspective.

Motor-vehicle crash injuries are the leading cause of death for more than three decades of life (*Injury in America*, 1985). In 1985 alone, approximately 43,800 people in the U.S. died in traffic accidents, and 3.5 million were injured (National Highway Traffic Safety Administration, 1986). Among the health-related costs to the nation, vehicle crashes rank second only to cancer (Hartunian et al., 1981); and in 1984, vehicle crashes were estimated to cost the U.S. $6.9 billion (National Highway Traffic Safety Administration, 1985). Indeed,

the prevention of motor vehicle trauma is "... one of the most formidable public health problems this nation faces" (McGinnis, 1984, p. 128).

Using shoulder and lap belts consistently during vehicle travel is the single most protective measure that can be conveniently taken to reduce the risk of death or injury in a vehicle crash. In fact, it is estimated that 55% of all fatalities and 65% of all injuries from vehicle crashes would be prevented if safety belts were used (*Federal Register*, 1984). Unfortunately, observational surveys indicate that about 75% of adults and 50% of children (from birth to 4 years) fail to use a vehicle safety belt or child safety seat (Ziegler, 1986). A nationwide increase in belt use of only 10% would prevent 30,000 injuries, and save 1,500 lives and $800 million in direct costs (Sleet, 1987).

From a policy or legal perspective, significant steps have been made in recent years to increase the use of safety belts and child safety seats. All 50 states have now passed legislation requiring young children (from birth to 4 years in most states) to be protected in child safety seats (Steed, 1987); and at the time of this writing, 31 states had enacted a mandatory safety belt use law (BUL) for front-seat occupants (Steed, 1988). Safety belt use has increased dramatically in virtually every state that has passed a BUL. For example, during the last six months of 1985, observations of safety belt use by front-seat occupants in 17 states without a BUL revealed 21.6% buckled up (Ziegler, 1986), whereas the mean post-BUL belt use across 27 states was 48% (Campbell et al., 1987). However, safety belt use following a BUL has declined markedly when media attention waned and has rarely stabilized above 50%. It is noteworthy that all of the BUL's require only front-seat belt use, even though a significant number of children ride in the back seat, where neither air bags nor automatic safety belts are available. Thus, interventions to increase voluntary belt use are particularly needed for back-seat occupants, many of whom are children.

Impact of the Virginia Belt Use Law

In Virginia, the BUL (secondary enforcement and a $25 fine) took effect in January 1988, and community belt use audits throughout the state indicate that the initial impact of this law has been substantial. For example, post-BUL belt use has ranged from 32% to 62% with a mean of 49.6% (n=13,073 observations) across ten Virginia communities, compared to average pre-law belt use of 27.5% (n=5,463 observations) in the same or comparable locales (Kalsher and Geller, 1988).

Immediately before and after the Virginia BUL, my students and I observed the safety belt use of children and adults while vehicles entered and exited the parking lot of three community locations: (a) a private, nonprofit Montessori school for preschoolers and children in grades one through five; (b) a community roller skating rink; and (c) a Burger King fast-food restaurant. Figure 1 summarizes the results of these observations. The numbers in the bars indicate the number of observations sampled for the percentages represented. At each community site, the observations were taken at times when the vehicle traffic was busiest (i.e., during weekday arrival and departure times at the school, on Saturday afternoons at the skating rink, and during the lunch and dinner hours at the fast-food restaurant). Baseline safety belt use was markedly higher at the Montessori school (55%, n=687) than at the skating rink (27%, n=198) and restaurant (27%, n=3408). This difference is partially due to the select "clientele" at the Montessori school (i.e., parents willing and able to pay for private education in lieu of public school) and to the safety belt intervention program we had implemented at the school during the preceding spring (1987). This successful intervention program is described later.

Figure 1 shows a prominent effect of the Virginia BUL on children and adults at the two community sites where baseline belt use was low. At the skating rink, overall post-BUL safety belt use increased 122% above baseline for children and 121% for adults, and increased 120% above baseline for children and 70% for adults at the restaurant. Whereas the safety belt use of children and adults at the Montessori school remained high each month after the BUL (i.e., about 77% belt use for children and adults), safety belt use showed decreases at the two other sites. At the skating rink, belt use dropped 21% for children and 11% for adults from January to March, 1988; and at the fast-food restaurant, belt use dropped 37% for children and 2% for adults from January to March, 1988. This observational data indicates that the Virginia belt use law has had a marked beneficial effect on the safety belt use of children and adults, even for local town travel. However, the BUL impact shown in Figure 1 occurred in the first months after the BUL went into effect and the media attention on safety belt issues was still relatively high.

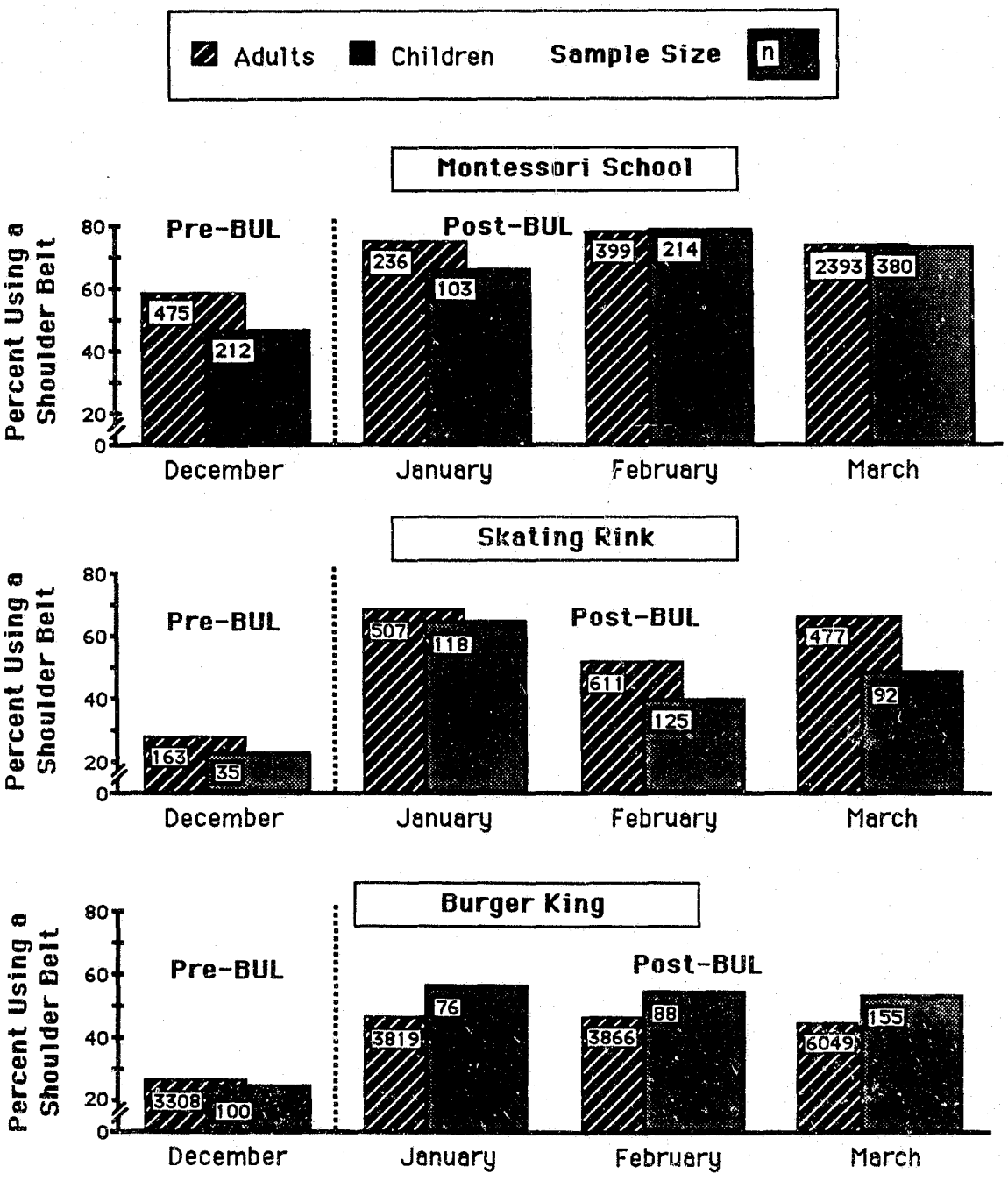

FIGURE 1

Percentage of children and adults using shoulder belts at three community sites before and after Virginia's belt use law (BUL).

It is obvious that no single approach will be sufficient to prevent injuries and fatalities resulting from nonuse of safety belts. Indeed, a theme of the *1987 Conference on Injury* was the urgent need for a comprehensive nationwide attack on this public health problem by politicians, corporate leaders, employee groups, health and medical professionals, educators, media writers and producers, grass roots agencies, civic and service clubs, and family members. This paper reviews research that developed and evaluated intervention strategies applicable by these individuals and groups to increase the use of safety belts among children and their parents.

A Community-Based Framework

Large-scale campaigns to increase the use of safety belts have often been implemented communitywide and have included a number of intervention components, including media promotion, awareness posters and fliers, group educational sessions, prize incentives, and buckle-up rewards (e.g., see reviews by Geller, 1984b; 1985a; Streff and Geller, 1986). Several communitywide incentive programs have demonstrated promising results (e.g., Campbell et al., 1983; Goke, 1983; Rudd and Geller, 1985), but not without a great deal of human effort and financial expenditures. Furthermore, these programs were short-lived and their effects transient because schemes were not applied successfully to get these programs institutionalized. Thus, a special challenge for developing long-term community programs is identifying and motivating delivery agents, sponsors, and support networks. In other words, community-based programs require an organizational scheme and motivational system for encouraging the indigenous businesses, institutions, and social groups of a community to initiate, maintain, and institutionalize long-term interventions to encourage safety belt use.

Figure 2 presents the framework for a general plan to motivate safety belt use. Rather than attempting to reach citizens in the community at large (e.g., at street corners, parking lots, or outdoor gatherings), I recommend that program sites be selected where a contained population of individuals can be "captured" for convenient program promotion and behavior change intervention (e.g., at an industry, bank, church, school, or swimming pool). At a particular program location, special agents are needed to manage the program, deliver the intervention, and evaluate program impact; and sponsors are needed to cover expenses for program materials (e.g., educational fliers, promotional gimmicks, incentives). Figure 2 illustrates the "location-agent-sponsor" networks which were targeted for the intervention research reviewed in this paper. Obviously, many additional networks for a community-based safety belt program are possible (cf. Geller, 1984b).

Educational Interventions

Over the years, educational strategies for promoting safety belt use have been numerous, varying from simple television prompts to comprehensive public education campaigns involving communitywide dissemination of signs, billboards, radio and TV advertisements, school programs, films, slide shows, and pamphlets. Typically, the impact of these educational efforts on safety belt use has been negligible, whether applied in employee safety programs (Geller, 1982; Phillips, 1980), through home television (Robertson et al., 1974), or throughout an entire community in varied formats (Cunliffe et al., 1975).

Geller and Hahn (1984) implemented a 20-minute educational program in a corporate setting that tripled safety belt use among blue-collar workers for a one-month period. Following a 3-minute film, the author led an informal group discussion about the value of safety belts and the factors that inhibit us from buckling up. Presumably, the key to the success of this program was active involvement of the workers in a group discussion. This educational approach toward safety belt promotion was replicated successfully with different discussion leaders at two large industries—at Buroughs Wellcome in Greenville, North Carolina (Cope et al., 1986) and at the Reeves Brothers Curon Plant in Cornelius, North Carolina (Kello et al., in press). Similarly, Kurt Lewin's (1958) classic research demonstrated the most behavior change following an educational intervention that got the participants actively involved in the presentation, through group discussions and stimulated "group-carried" discussions. The first intervention study described here evaluated the behavioral impact of an interactive educational approach to motivate young children to buckle up.

LOCATIONS	+	AGENTS	+	SPONSORS	=	RECIPIENTS
Community		Management Delivery Evaluation		Promotion Rewards		Children Adults

Examples:

Elementary Schools	+	Teachers	+	Merchants Schools	=	Students
Swimming Pools	+	Lifeguards	+	Business Merchants	=	Children Adults
Summer Recreation Program	+	Teachers Assistants	+	County Officials	=	Children
Skating Rink	+	Management Employees Crash Dummies	+	Business Merchants	=	Customers
Fast Food Restaurant	+	Crash Dummies Employees	+	Business Merchants	=	Customers

FIGURE 2

Potential benefactors and beneficiaries for community-based safety belt programs.

Participative Education for Children

This research was conducted at a private, non-profit Montessori school with 33 children in half-day pre-kindergarten, 14 children in full-day kindergarten, and 18 children in primary grades one through five. All of the children rode to school in their parents' car. We gave the head teacher (and owner of the school) a copy of a short children's play about safety belts and suggested that the preschool children act out this play for their parents. The teacher read the story while the children played the roles of the various characters in the skit. The hero was a young child named "Buckie Buckle" who always used his safety belt to set an example for others. Buckie Buckle rode in a car at different times with his father, mother, grandpa, grandma, and cousin. With each of these drivers, a scenario was given whereby Buckie Buckle buckles up and affirms, "I love my buckle buckled". Each driver gave one of the standard excuses for not using a safety belt and was subsequently injured when the vehicle crashed. The children observers readily anticipated the story lines as the pattern of the skit was repeated and they were encouraged by the teacher to say the key phrases such as, "I love my buckle buckled" each time Buckie Buckle buckled up.

After observing unobtrusively the front-seat safety belt use of children and parents in the parking lot of the Montessori school for five days, the preschool children ages 3 to 5 practiced the Buckie Buckle play each day for a week and then presented the 15-minute skit to their parents. Three days later, the children presented the same skit to the 18 children attending the primary classes of the school. During this 5-day intervention period, we observed unobtrusively the safety belt use of front-seat occupants when vehicles entered and exited the school's parking lot. Then, we returned three months later for five consecutive days of follow-up observation.

By recording vehicle license plate numbers, we were able to track the safety belt use of individual children and their parents throughout the three phases of this study (Baseline, Intervention, and Follow-Up). Figure 3 depicts the safety belt use of matched child-parent pairs whom we observed on at least three occasions during each phase and who were not buckled up on every occasion. During Baseline, the preschool children were observed buckled up most often, perhaps because they most recently rode in child safety seats. These children also showed the greatest increase in safety belt use during the intervention phase, presumably because they were active participants in the Buckie Buckle skit. This dramatic increase did not continue into the Follow-Up phase, possibly because of the lack of supportive modeling by parents.

The passive participants (i.e., the parents of the preschoolers and the children in the primary classes) showed equivalent increases in safety belt use during the intervention phase and maintained this increase three months later. The parents of the primary school children received no intervention and therefore served as a control group. Since these subjects did not change their safety belt use throughout the study, functional control of the intervention is indicated. These results suggest that an educational intervention that provides substantial opportunities for small group interaction may be sufficient to increase the occurrence of a target behavior, if that behavior is convenient and as intuitively beneficial as is safety belt use. There are, however, situations where it is not possible to conduct participative education/awareness sessions, and therefore an additional behavior change strategy is needed such as extrinsic rewards.

Incentive/Reward Interventions

Most of the incentive-based programs for safety belt promotion have involved the direct and immediate delivery of small prizes to vehicle occupants observed wearing their safety belts, and most of these programs targeted adults in vehicles at entrances/exits to industrial complexes (e.g., Geller, 1983; 1985b; Spoonhour, 1981; Stutts et al., 1984), at the exchange windows of banks (Geller et al., 1982a; Johnson and Geller, 1984) or fast food restaurants (Ludwick, 1983), at the entrances to the parking lot of high schools (Campbell et al., 1984), a university (Geller et al., 1982b), a shopping mall (Elman and Killebrew, 1978), and at street corners throughout a community (Campbell et al., 1983). Another successful incentive/reward approach that targeted adults, involved the recording of license plate numbers of vehicles with occupants using safety belts, placing these numbers in a prize drawing, and then contacting winners later to receive rewards for safety belt use. This delayed reward technique has generally been just as successful as the immediate reward procedure (Geller et al., 1987), and has been most practical for large-scale application at industrial sites (Geller, 1984a; Geller and Hahn, 1984), and throughout a university campus (Rudd and Geller, 1985) and naval base (Kalsher et al., 1988).

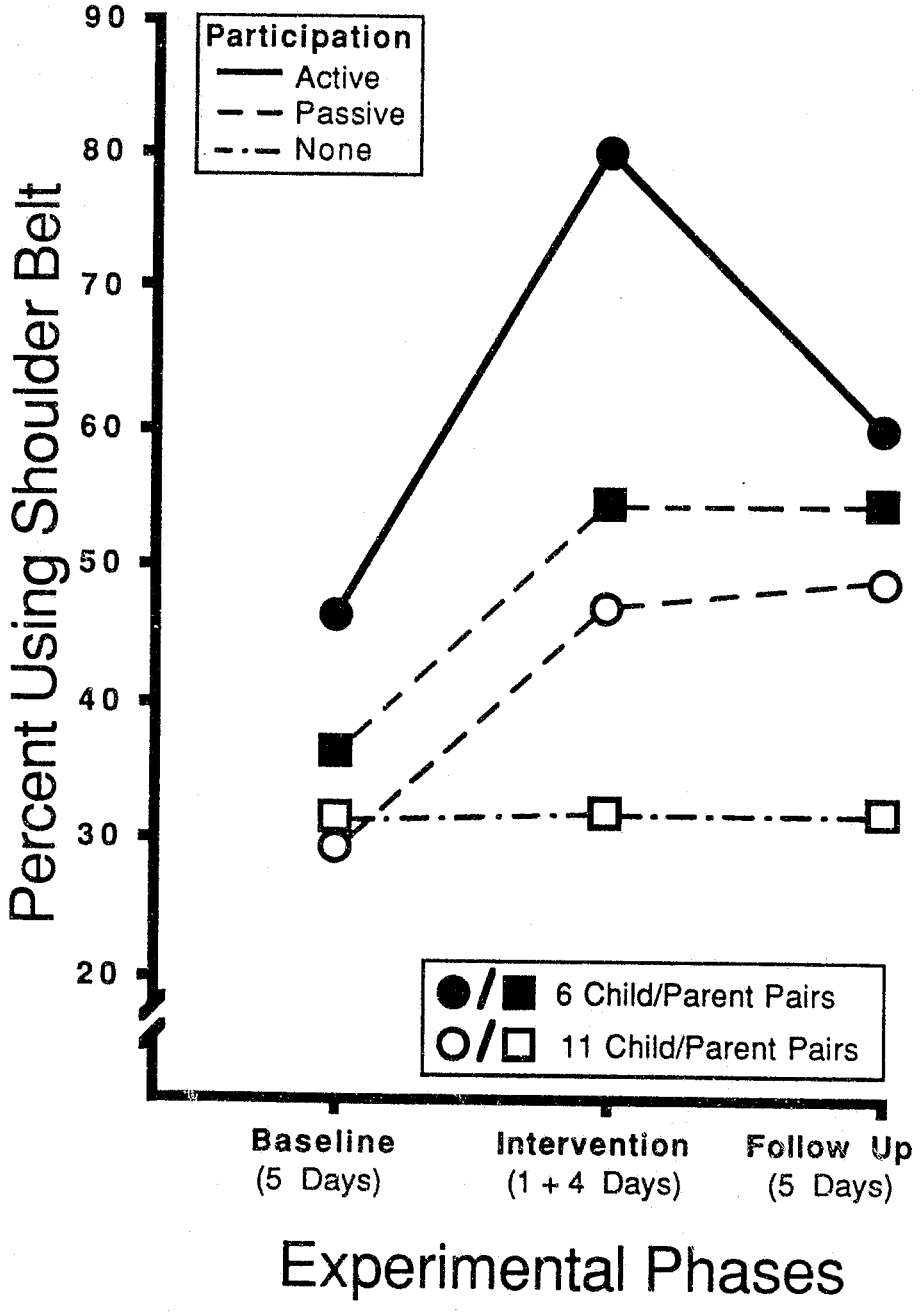

FIGURE 3

Percentage of children and parents buckled up at a Montessori school as a function of their active, passive, or no participation in a safety belt skit.

None of the reward programs referred to so far targeted young children, perhaps the most critical age group for developing a "buckle-up" habit. Michael Roberts and his colleagues have successfully applied immediate reward strategies to protect children in vehicles by rewarding parents with lottery tickets redeemable for prizes if their children (age birth to 6 years) were appropriately buckled up when arriving at day care centers (Roberts and Turner, 1986), by rewarding preschool-aged children with colorful stickers when they arrived at day care centers in safety belts or child safety seats (Roberts and Layfield, 1987), and by teaching PTA volunteers to reward elementary school children with lapel stickers, lottery tickets for pizzas, bumper stickers, and coloring books if all vehicle occupants were buckled up when arriving at school (Roberts and Fanurick, 1986; Roberts et al., 1988). In all of these child-targeted studies, the use of safety belts or child safety seats increased dramatically, from baseline buckle-up averages as low as 5% (Roberts and Fanurick, 1986) and 11% (Roberts and Turner, 1986) to belt use percentages of 70% and 64%, respectively. When these reward programs were withdrawn, safety belt use declined, but remained prominently higher than the initial baseline levels, as with the reward programs that targeted adults (e.g., see reviews by Geller, 1982a; 1984b).

A Swimming Pool Program

During the Summer of 1987, my students and I initiated a three-year safety belt program at three community swimming pools (two public and one private), whereby lifeguards promoted safety belt awareness during children's swimming lessons. More specifically, the lifeguards were asked to give a short safety belt message at the end of their swimming lessons each morning and then to hand out "buckle up promise cards" (see Figure 4) to the children for their signatures. The lifeguards were given the following written statement to prompt and guide their safety belt message to the children.

> *"Now that you have just completed one of the safest parts of your day (i.e., swim lessons), we need to think about a more dangerous part of your day—traveling in an automobile. Just like we are lifeguards, you too can be a lifeguard by buckling your safety belt every time you ride in a car."*

The buckle-up promise cards were given to the children after their swimming lessons, and were available each day of the intervention period at the entrance to the pool. On one side of the promise card was a message to the parents, and on the opposite side there was a riddle for the children that made the connection between lifeguards and safety belts. As shown in Figure 4, one portion of the promise card was designed to be detached and hung on the inside rearview mirror of the vehicle, with a child's commitment signature on one side and the parent's signature on the other.

At the two largest swimming pools (each in different adjacent towns) an incentive program was established to motivate the dissemination and display of the promise cards. Specifically, it was announced on a large poster at the entrance to these two pools that those who took a promise card would receive a pack of lifesavers (donated by the Nabisco Company) and could become a lifeguard by sending in the post-card portion of the promise card and receiving copies of the promise card to distribute to their friends. At one pool (Montgomery), the poster also indicted that program participants would be eligible to win free prizes if they hung a portion of the promise card in their car. At the other pool (Radford), the poster announced that free prizes would be available if the vehicle occupant displayed the promise card and was buckled up.

A large 3 1/2 foot trophy (donated by a local sporting goods store) was rotated weekly between the two public pools and was displayed conspicuously at each pool's front gate with an attendant sign that read, "*YOU CAN HELP YOUR POOL WIN THIS TROPHY BY DISPLAYING YOUR PROMISE CARD. SEE A LIFEGUARD FOR DETAILS.*" Each lifeguard at the public pools (seven per pool), was given a special "Vince and Larry" buckle-up T-shirt, donated by the Virginia Department of Motor Vehicles, to wear in support of the safety belt program.

At the private pool, there were no rewards given for picking up a buckle-up promise card, displaying the promise card, or for using a safety belt. Instead, the lifeguards were offered an incentive for encouraging children to sign the promise card and return the post-card portion with the lifeguard's signature to request more promise cards. More specifically, the five lifeguards were told that each guard would receive a "Vince and Larry" T-shirt when our office received five postcards with that guard's signature from different children. If we received 10 different post cards with a particular lifeguard's signature, that guard would receive a wrist watch

DEAR PARENT:

Traffic accidents are the **NUMBER ONE** killer of young people (ages 2 to 44). Every year in this country more than 34,000 people are killed and 500,000 are injured in traffic accidents, amounting to annual financial liabilities exceeding $60 billion. More than half these deaths and injuries could be prevented ***if safety belts were used consistently.***

MAKE A

BUCKLE UP PROMISE

One out of every 60 children born today will die in a highway crash. Three out of four highway fatalities occur within 25 miles of home. Thus it is critical to develop the ***habit of buckling up*** on **EVERY** trip. So for your own sake and your family please consider joining your child in making a buckle up promise....

. . . IT COULD BE A LIFESAVER

Tear off the card and hang it on your rearview mirror as a reminder of your promise to buckle up.

BUCKLE UP PROMISE

I promise to use my safety belt every time I drive or ride in a car for the next month. I will encourage others to do the same.

Signed _____

BUCKLE UP

I

BUCKLE UP

your name

_____

IS A SAFETY BELT AND A ROUND PIECE OF CANDY THE SAME?

YES ... BOTH ARE

BUCKLE
CLICK
SAFETY
BELT
STRAP
LAW
DRIVE
SEAT
TRIP
CARS

If you can solve this riddle you are no dummy.
You may save your life too by MAKING A ...

BUCKLE UP PROMISE

To make a promise, write your name

FIGURE 4

The front and back of the "Buckle-Up Promise Card" used in the swimming pool safety belt program.

donated by Ford Motor Company. Apparently these incentives were not sufficient to motivate these lifeguards to support the program, since no lifeguard earned even the T-shirt reward.

The safety belt use data, collected by unobtrusively observing vehicle occupants entering and exiting each pool's parking lot, indicated a failure of the latter program (at the smaller, private pool) to influence the safety belt use of children. On the other hand, our safety belt observations at the two large public swimming pools indicated that their incentive/reward programs were effective at increasing the safety belt use of both children and adults. Figure 5 depicts the data that led to these conclusions. The figure partitions the observed belt use percentages into four phases or experimental conditions per swimming pool and shows prominent increases in belt use among children and adults at both public pools, when the program materials (i.e., promise cards, posters, and trophy) were placed at the pools. However, only at the Radford pool did the belt use of adults and children increase again when rewards were offered in the parking lot (i.e., when the promise card was displayed and an occupant was buckled up).

At the Shawnee pool, the belt use of children and adults during baseline was much higher than at the public pools, and only the belt use of adults increased upon the introduction of program materials, from a baseline mean of 59% buckled over 14 days to 70% belt use over seven days, when the materials were introduced (a 17% increase above baseline). At the Radford pool, belt use increased 146% above baseline for adults and 121% for children when the program was initiated. When the buckle-up rewards were given in the parking lot (i.e., packets of life savers donated by Nabisco, and french-fry coupons donated by Wendy's), the belt use percentage of adults and children increased again, from 32% to 45% for adults and from 31% to 50% for children. When the program materials were put in place at the Montgomery pool, the safety belt use of adults increased from 24% (over 12 baseline days) to 37% (over 9 intervention days), and the belt use of children increased from 24% to 41%. Chi Square analyses indicated that all of these increases at the public pools were significant ($ps < .01$). The rewards for displaying the promise card had only a slight insignificant impact on safety belt use, increasing belt use from 37% to 38% for adults and from 41% to 48% for children. It is noteworthy that only for the Radford pool was there a significant decrease ($p < .01$) in safety belt use when the incentive/reward program was withdrawn.

Extrinsic Rewards: When are they Beneficial?

The data reported so far suggest that extrinsic incentives and rewards may be useful to promote safety belt use among children in some situations, such as a large community swimming pool, where participative education is not possible. However, when the reinforcement contingency was most directly linked to the target behavior (i.e., rewards at the Radford pool for using a safety belt) and thus produced the greatest change in safety belt use, the largest decline in belt use occurred after these rewards were withdrawn. The observations reported here were situational specific and limited in number (i.e., there were relatively few observations during the withdrawal periods), and therefore these interpretations must be tentative. Nevertheless, such conclusions are supported by research that studied ways of motivating adults to buckle up (Geller, 1984b; Geller et al., 1987).

Geller et al. (1987) reviewed five corporate safety belt programs that did not use rewards, but rather applied an interactive small-group discussion format. After a 20- to 25-minute group discussion, buckle-up pledge cards were distributed, and participants were urged by the group leader and by other participants to make a buckle-up commitment. When the participants left the room, they deposited a portion of each signed pledge card in a "pledge box". After comparing these programs that used no extrinsic incentives/rewards (detailed in Cope et al., 1986; Geller and Bigelow, 1984; Kello et al., in press) with 13 reward programs, Geller et al. (1987) concluded that the immediate behavioral impact of the reward and no-reward programs was equivalent. However, after these programs terminated, there was consistently greater maintenance of safety belt use for the no-reward programs.

Several theoretical formulations and laboratory investigations suggest that extrinsic rewards may not be a desirable approach for motivating lasting behavior change. Indeed, the conceptualization and investigation of the "minimal justification principle" (Lepper, 1981), "over justification" (e.g., Lepper et al., 1973), and "intrinsic motivation" (Deci, 1975; Deci and Ryan, 1980) predict greater long-term behavior change with interventions that minimize extrinsic controls. Powerful extrinsic motivators are assumed to inhibit individuals from gaining an internal justification for performing the target behavior after the external controls are withdrawn. Clearly

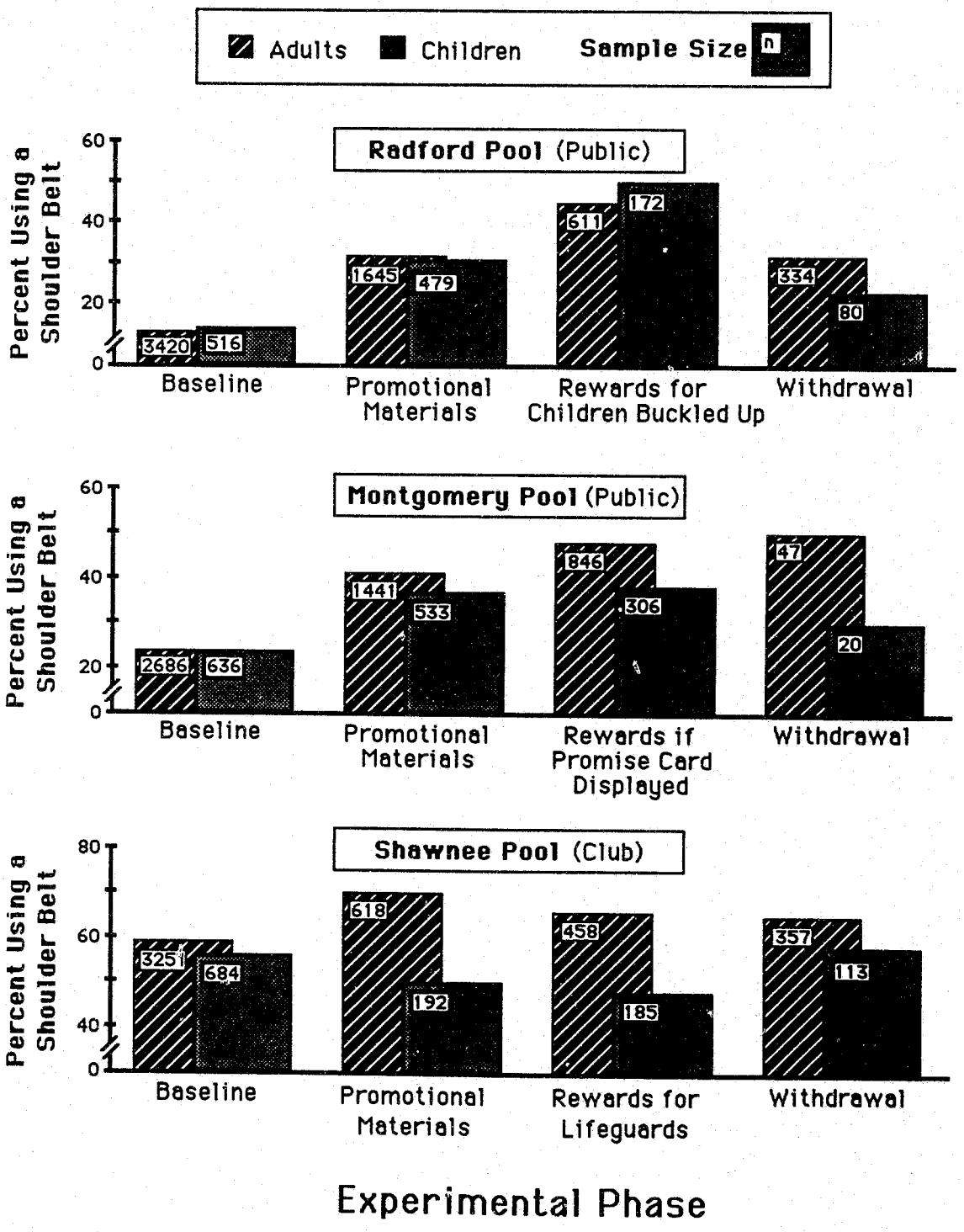

FIGURE 5

Percentage of children and adults using shoulder belts at three swimming pools as a function of pre-intervention, intervention, and post-intervention phases.

more research is needed to define the parameters for obtaining enough extrinsic control to initiate the buckle-up response, but not too much so as to obviate perceived internal control and intrinsic justification. Thus, if a school program can motivate safety belt use without the use of extrinsic rewards (e.g., the Montessori program described earlier), the addition of extrinsic incentives/rewards might actually detract from program impact, especially with regard to post-program response maintenance. This was a primary issue addressed in the final field investigation described here that studied the impact of combining participative education with three different reward contingencies.

Subjects and Setting

The subjects were 88 children ages 5 to 11 who attended a six-week, half-day recreation program during the Summer of 1987 at three different public schools. Approximately the same number of children (mean=29) attended each school during the three-hour recreation program which was held from 9:00 a.m. to 12 noon and was coordinated by community parks and recreation staff. Thus, the subjects and setting were similar to that of the Montessori school.

Intervention Conditions

After collecting two weeks of baseline belt use data while vehicles entered and exited the parking lots of the schools (during morning arrival and afternoon departure), we implemented 30-minute safety belt programs at the schools on each of the five weekdays. The daily intervention programs were designed to promote maximum audience participation and involvement, and included the following different activities on each of the five days.

1. **Awareness** - Children received a data book for recording the safety belt use in their vehicles when arriving and departing the school, and they drew safety belt pictures on posters while listening to a special "buckle-up" song (see Figure 6).

2. **Commitment** - Children received a visit from the popular crash-test dummies (Vince and Larry) who distributed buckle-up pledge cards for the children's commitment signatures.

3. **Role Play** - Children participated in the Buckie Buckle skit as described earlier and then received an opportunity to order a membership card for the "Buckie Buckle" club.

4. **Modeling** - A local police officer discussed the value and use of safety belts with the children and then let them sit in his police car and use the vehicle safety belts (see Figure 7).

5. **Rule Transfer** - Children held up a "flash card" that read *"PLEASE BUCKLE UP -- I CARE"* while their parents entered the schools' parking lots (see Figure 8). If a driver or passenger buckled up after this prompt, the children flipped the flash card over to show the message, *"THANK YOU FOR BUCKLING UP."*

Although each intervention was presented at the three schools, certain administrative procedures were varied to study the effect of two different reward contingencies. At one school, the children (n=34) received trinkets each day only if they were buckled up when departing in their vehicle; at a second school, the children (n=26) were given the trinkets after they participated in the daily safety belt activity; and at the third school, trinkets were given to the children (n=28) at the start of the program and thus were not contingent on any particular behavior. Thus, three reward conditions were implemented, referred to as Buckle-Up Rewards (BR), Participation Rewards (PR) and Noncontingent Rewards (NR).

Measures of program participation were taken, as well as unobtrusive observations of safety belt use before, during, and after the intervention week. On five occasions (i.e., on the Thursday before the intervention week, on the Thursday of the intervention week, and three Thursdays after the intervention week), the children were given coupons redeemable for food on the next Saturday at the drive-through window of the local Burger King restaurant. These coupons were distributed by the recreation staff and were not associated with the safety belt program. As a holiday gift from the recreation staff, the children were mailed food coupons redeemable at Burger King on the Saturday following Christmas, five months after the summer recreation program. We

FIGURE 6

Children draw safety belt posters during the first safety belt program (i.e., Awareness intervention).

FIGURE 7

Children get in the police car and buckle up while others wait their turn.

FIGURE 8

Children "flash" their parents to buckle up when they enter the parking area to pick them up.

unobtrusively observed safety belt use at the Burger King drive-through window on these Saturdays in order to study generalization and maintenance of intervention effects. [Note that all of the food coupons (valued at approximately $500) were donated by Burger King of Blacksburg.]

Results and Interpretation

Program participation. The number of children with perfect attendance was 16(47%), 10(30%), and 10(36%) for the BR, PR, and NR conditions respectively; and the mean intervention days attended per child was 3.9, 3.7, and 3.2 at the BR, PR, and NR schools. Thus, there was no indication that attendance rates varied as a function of the reinforcement contingency. However, significantly greater participation was shown by those in the PR condition (i.e., children receiving rewards for their participation) with analyses of the following behavioral indices: (a) the percent of children who completed a poster drawing, (b) the percent of children who joined the "Buckie Buckle Club", (c) the percent of children who returned a "score card" from using the "Buckle-Up Flash Card", and (d) the percent of children who returned completed pages of their "Safety Belt Data Book" each day ($ps < .01$).

Children's' shoulder belt use. Because license plate numbers were recorded during observations of safety belt use, it was possible to match children with their parents (i.e., the vehicle drivers) and track the belt use of individual child-parent pairs over successive days at both the school and the fast-food restaurant. The 16 children who were observed buckled up on every occasion were not included in this analysis, since their data would only raise the means a constant amount across conditions.

Figure 9 depicts the percentage of children at each school who were using their shoulder belt during the consecutive phases of the study: Baseline (10 days, 271 total observations), Intervention (5 days, 136 total observations), and Withdrawal (15 days, 379 total observations). At Baseline and Intervention, the belt use percentages were essentially equivalent across schools and reflected substantial behavioral impact of the five, 30-minute intervention programs. The percent increase from relatively high baseline rates was 59%, 60%, and 73% for the BR, PR, and NR groups, respectively. Given that the NR group showed the greatest gain in belt use, no benefit of rewards contingent on belt use or program participation was demonstrated. In fact, the belt use percentages during Withdrawal suggested a disadvantage for the BR group. That is, safety belt use actually increased slightly from the Intervention to the Withdrawal phase for the PR contingency (i.e., 83% to 86%) and the NR condition (i.e., 85% to 86%); however, children in the BR group decreased their belt use slightly during the Withdrawal phase (i.e., from 82% to 79%). The Chi Square analysis for the 3 (Contingencies) x 3 (Phases) factorial showed only a main effect of phase, $\chi^2 = 65.8, p < .0001$.

Figure 10 illustrates the mean safety belt use of the children before and after each intervention activity. In other words, the percentage of children buckled up when arriving at school in the morning and departing school the same day is shown for each day of the intervention period, and for the average arrival versus departure percentages during the Baseline and Withdrawal periods. This figure shows dramatic effects of the intervention activity, in that belt use was prominently higher when leaving than departing the school on the first four intervention days; and throughout the intervention week, belt use during morning arrival increased successively. The somewhat inconsistent data for Rule Transfer on Friday may be due to the fact that attendance was particularly low on this day because the children were bused to the Montgomery swimming pool after the 30-minute morning program. Many parents chose to drive their children straight to the swimming pool from home.

Parents' shoulder belt use. Figure 11 depicts the shoulder belt use of the parents who drove those children whose safety belt use is depicted in Figures 6 and 7. Across schools, the vehicle drivers did not start at the same baseline level of shoulder belt use, but it is obvious that the intervention program for the children increased the safety belt use of the parents. The belt-use increases from the baseline to the intervention phases were similar for the two contingent reward conditions, from 57% belt use during Baseline (n=181) to 66% belt use (n=123) during Intervention for the BR group, and from 66% (n=62) during Baseline to 78% (n=40) during Intervention for the PR group. The parents whose children were in the NR condition showed the greatest increase from the Baseline phase (42% belt use, n=206) to the Intervention phase (66% belt use, n=110).

The most dramatic group differences occurred during the Withdrawal phase. Whereas the RP and RN groups showed equivalent increases in shoulder belt use from Intervention to Withdrawal (an increase of 9 percentage points per group), the BR group showed a 5% drop in safety belt use. This difference was largely responsible for the significant interaction term($\chi^2 = 19.7, p < .0006$) obtained from the 3 (Phases) x 3 (Reward Contingencies) Chi Square analysis. The two main effects were also reliable in this analysis; i.e., $\chi^2 = 31.2, p < .0001$ for phase and $\chi^2 = 15.6, p < .0004$ for reward contingency. This finding suggests that the extrinsic control exerted on the children in the parents' presence (i.e., in their vehicles) influenced some parents to decrease their safety belt use when the belt use-reward contingency was withdrawn.

Figure 12 illustrates most dramatically that parents were influenced by the safety belt intervention activities experienced by their children. This figure depicts the percentage of parents (i.e., the vehicle drivers) buckled up during the experimental phases when they arrived in the schools' parking lots to pick up their children at 12 noon and when they left the schools with their children in their vehicles. The baseline and withdrawal data represent averages across all noon arrivals versus departures during each respective phase, and indicate only slightly more belt use by parents when their children were passengers. In contrast, the daily arrival versus departure data during the intervention week show prominently higher safety belt use by vehicle drivers when children were in the vehicles after the 30-minute safety belt program, than when arriving at the school just minutes earlier to pick up their children. Overall, during the intervention week, the mean percentage of parents buckled up when arriving without a child passenger was 63.5% (n=148), compared to 77.4% (n=124) buckled up when departing the parking lot with children as passengers.

Back-seat belt use. All of the safety belt data presented in this paper so far resulted from observations of shoulder belt use by front-seat occupants. In order to monitor the use of lap belts in the back seats of vehicles, we asked drivers to stop their vehicles when exciting the parking lots during the last Friday of each experimental phase (i.e., Baseline, Intervention, and Withdrawal). The vehicle stopping was always associated

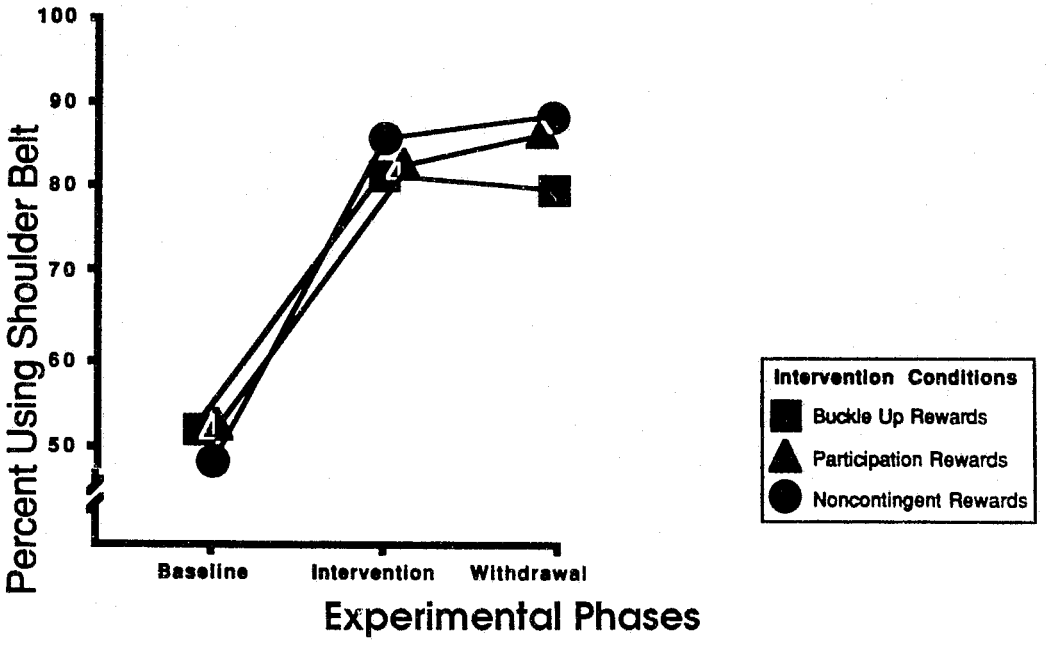

FIGURE 9

Mean shoulder belt use of children who attended at least one safety belt intervention day and were not buckled up for 100% of the baseline observations.

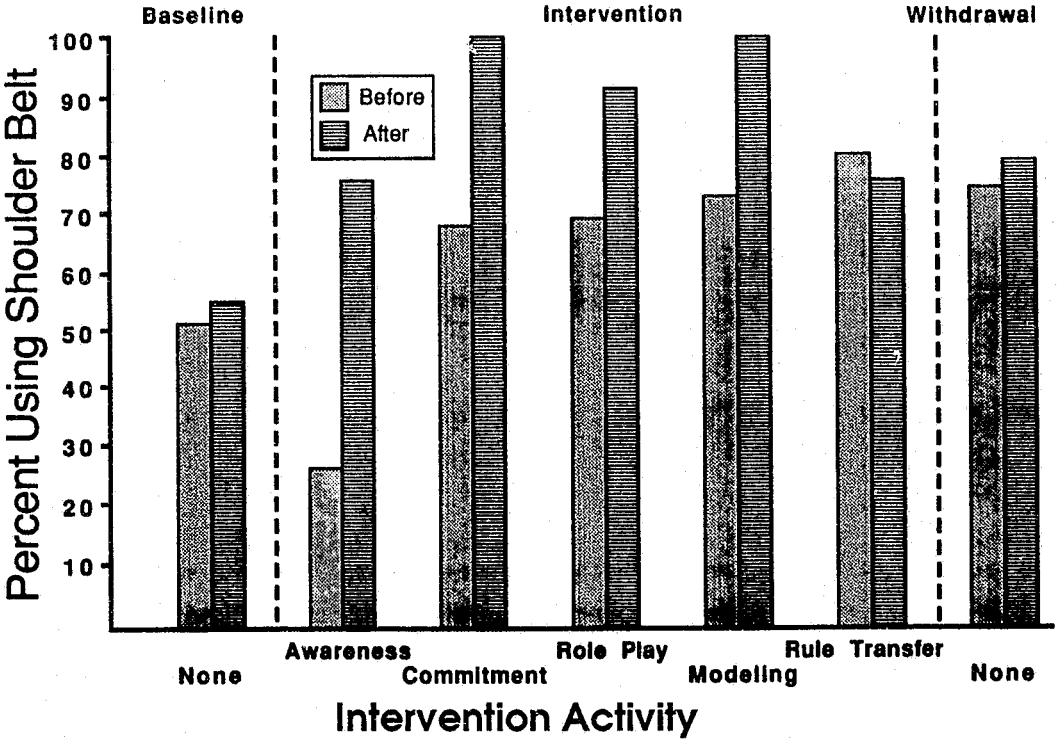

FIGURE 10

Mean shoulder belt use of target children in the recreation program when arriving vs. departing school during the Baseline and Withdrawal phases, and before (arrival) vs. after (departure) experiencing each daily intervention activity (data combined across schools.)

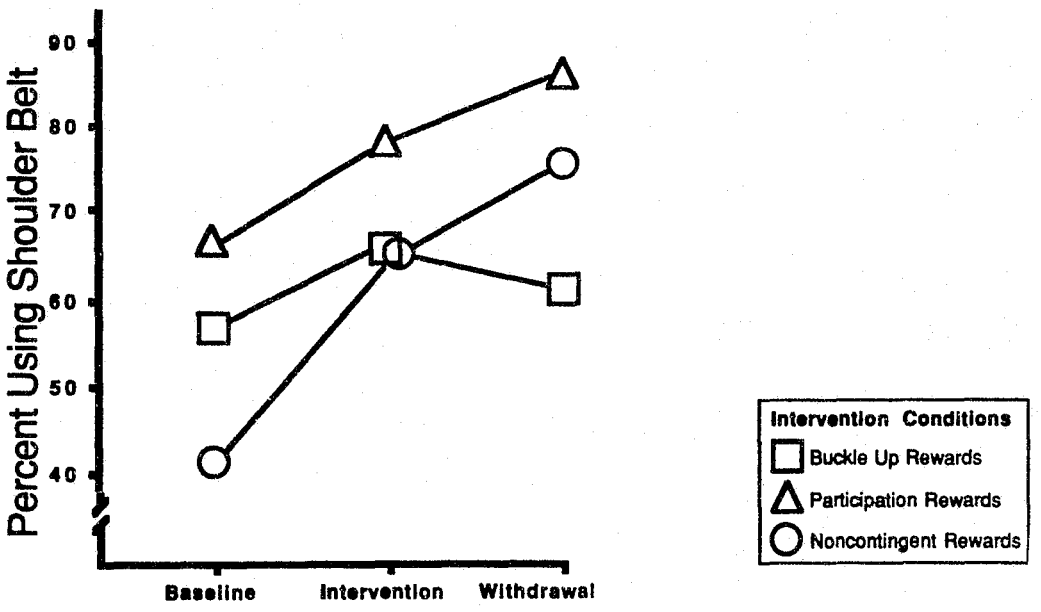

FIGURE 11

Mean shoulder belt use of the parents of the target children as a function of the three experimental phases and the intervention condition given their children.

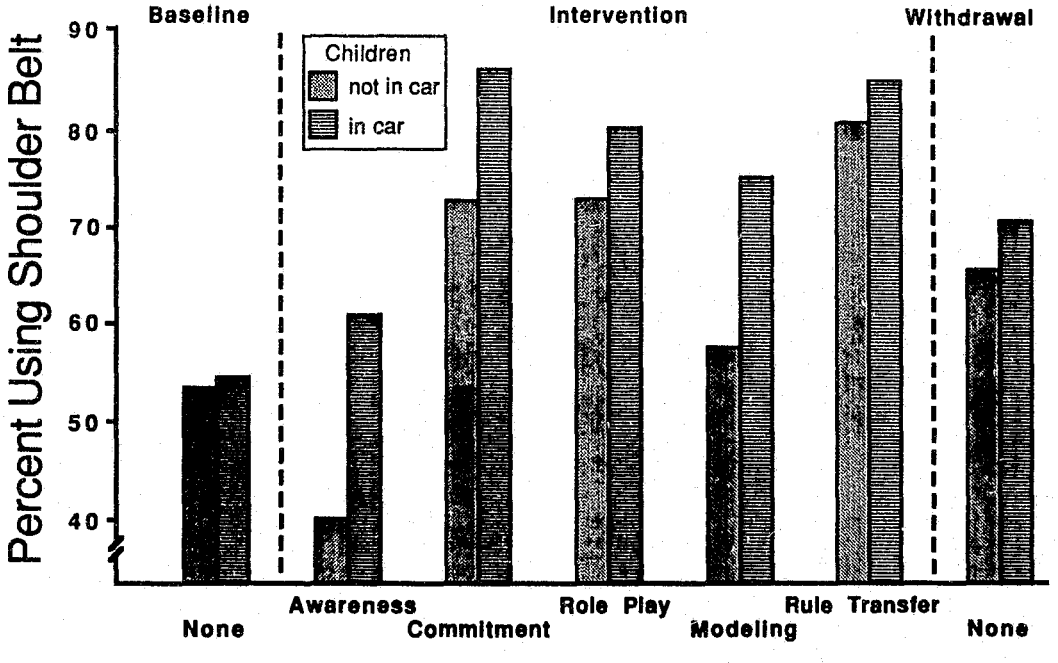

FIGURE 12

Mean shoulder belt use of the parents of the target children before and after their children got in their car at noon during Baseline, Withdrawal, and following each daily intervention activity (data combined across schools).

with a program activity and the recording of safety belt use was concealed. More specifically, during the first "vehicle-stopping" session (during Baseline), we handed out vehicle litter bags donated by Keep America Beautiful, Inc. During the intervention week, the vehicles were stopped by observers holding balloons and wearing clown costumes, and each child was given a free meal coupon for the local Burger King restaurant. During the Withdrawal phase, the vehicles were stopped to distribute membership cards for the "Buckie Buckle Club" to those children who mailed in an application form. Application forms were given to children who didn't receive a club card.

Figure 13 illustrates the mean percentage of children buckled up in the front versus the back seat of vehicles during the three observation days that the drivers were asked to pull over while exiting the schools' parking lots. The percentages are averaged across the three schools. The significant finding is that during the Baseline and Withdrawal sessions, mean safety belt use was substantially lower in the back seat (39% of 33 observations during Baseline and 31% of 22 observations during Withdrawal) than the front seat (60% of 30 observations during Baseline and 52% of 23 observations during Withdrawal). In contrast, on the last day of the intervention week the safety belt use of children in the front and back seat were practically the same (i.e, 75% of 28 observations for front-seat belt use and 76% of 25 observations for back-seat belt use). These percentages are significantly higher than the belt use observed during Baseline and Withdrawal, (χ^2=12.1, $p < .002$). These results show clearly that the intervention activities had dramatic and similar beneficial effects on children occupying both the front and back seats. However, the lower use of safety belts among back-seat occupants during the Baseline and Withdrawal phases indicates a need to design intervention strategies that give special attention to encouraging the use of lap belts by back-seat passengers. Perhaps "buckle-up promise cards" for children should be designed for display in the rear seat of vehicles as reminders to buckle up.

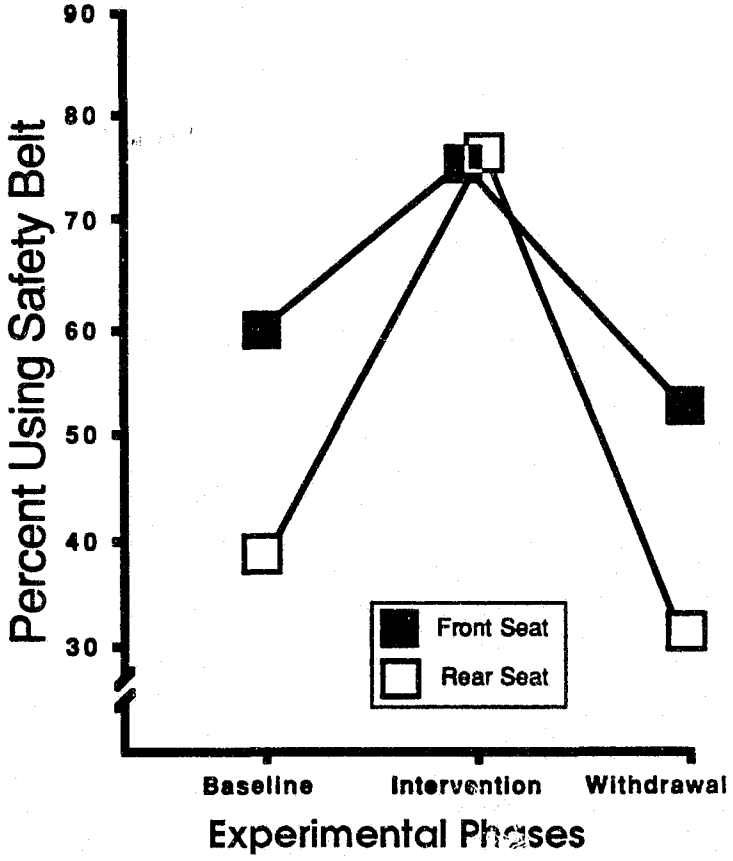

FIGURE 13

Mean percentage of children buckled up in the front vs. the back seat as a function of the experimental phase (data combined across schools).

A generalization test. Free meal coupons for certain Saturdays at the drive-through exchange window of a fast food restaurant were distributed to the children once during each experimented phase, and mailed to the children during the Christmas holidays in order to assess whether the impact of the intervention strategies generalized beyond the immediate school setting. The front and back-seat use of safety belts by children and adults was assessed unobtrusively by having two observers, dressed in clown costumes, hand out Burger King balloons to all children occupying the vehicles that were stopped at the drive-through window at Burger King. The recording of vehicle license plate numbers made it possible to match Burger King customers with vehicles observed at the schools.

Figure 14 depicts the percentage of program participants (i.e., children) and their parents (i.e., vehicle drivers) using safety belts during each experimental phase when pulling into the drive-through area at Burger King. Generalization of intervention impact is demonstrated by the 42.5% increase in safety belt use by both children and parents from the Baseline phase (50.8% use by children, n=63; 57.6% use by parents, n=59) to the Intervention phase (78.0% use by children, n=41; and 76.5% use by parents, n=34). Unfortunately, this generalization did not last long, since safety belt use dropped substantially during the Withdrawal phase to 60% use by children (n=35) and 71.4% use by parents (n=28). Three months later during the Follow-Up phase, the safety belt use at the restaurant site had dropped below the subjects' baseline levels to 43.3% use by children (n=30) and 45.5% use by parents (n=33). It is noteworthy that the follow-up observations were taken on the Saturday after Christmas 1987, three days before the Virginia safety belt use law took effect.

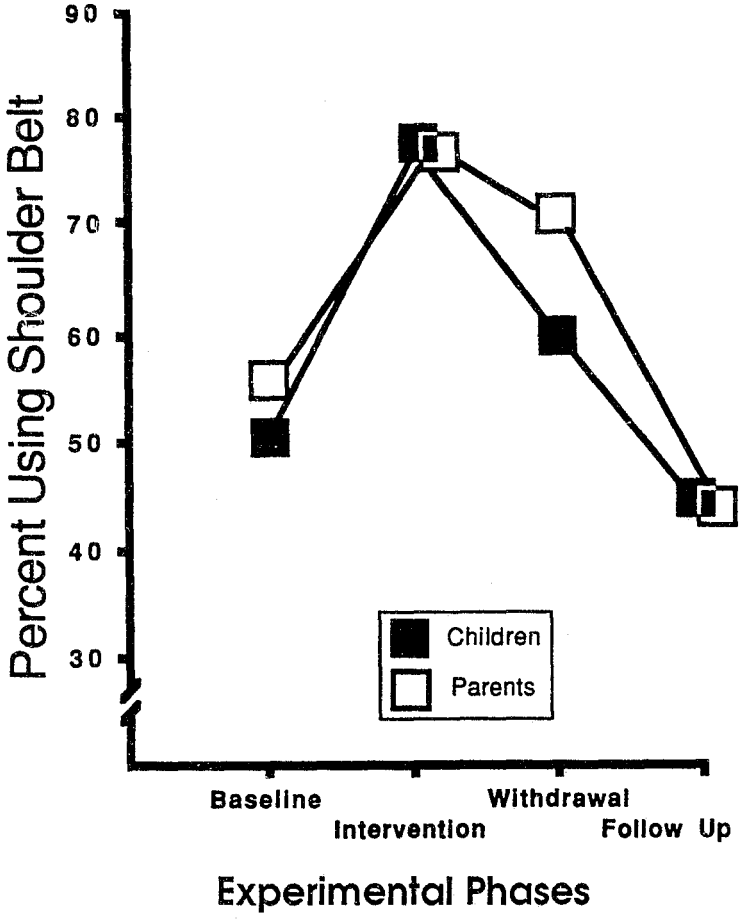

FIGURE 14

Mean percentage of children and parents using safety belts in front and back seat while approaching the drive-through area of Burger King as a function of four experimental phases (data combined across schools).

Summary and Conclusions

In summary, the field studies reported here showed substantial increases in safety belt use among children and adults during the initial months following the initiation of Virginia's BUL. However, there were marked decreases in post-BUL belt use at two community sites (a skating rink and a fast food restaurant). This decrease was not found at a Montessori school where a participative education program for safety belt promotion had been implemented, suggesting the need to integrate effective education with large-scale policy to increase safety belt use. This educational program was effective at increasing safety belt use among active participants (preschool children) in a "Buckie Buckle" skit and among passive observers of the skit (i.e., primary-school children and parents of the preschoolers).

The follow-up study that evaluated the addition of extrinsic rewards for either program participation or for using a safety belt, found no advantages of extrinsic rewards in terms of the primary behavioral objective—increasing safety belt use among children. In fact, the results suggest that extrinsic rewards may have been detrimental in this case, since only the children and their parents in the BR group showed a decrease in safety belt use during the three-week, post-intervention phase. Apparently, the participative educational intervention was powerful enough to produce maximum behavior change, and consistent with theories of "over justification" and "intrinsic motivation", the addition of extrinsic motivators lessened intrinsic motivation to maintain the desired buckle-up response. The Withdrawal phase of this research, however, was only three weeks, and thus the evidence for differential decay or extinction of safety belt use was quite limited. Follow-up research should track post-intervention belt use over longer periods of time, and perhaps identify functional relationships between different reward contingencies during intervention and degree of post-intervention maintenance of gains in safety belt use.

A noteworthy contribution of this latter study was an evaluation of generalization effects enabled by the tracking of vehicle license plate numbers and the participants' redemption of Burger King meal coupons on designated days. The "generalization probes" during each experimental phase and during the Christmas vacation demonstrated that the behavioral impact of the intervention activities did generalize to another community site, but this effect was unfortunately transient. While safety belt use at the schools remained high during the three-week Withdrawal phase, belt use decreased markedly at the restaurant site; and our observations at Burger King five months later showed safety belt use below the Baseline generalization probe and the initial baseline levels obtained at the schools during the summer. It would have been informative to include a number of generalization probes during the period between the Withdrawal phase and the final generalization probe. More desirable would be a study of periodic generalization probes while long term follow-up belt use is tracked at the intervention site. At this point, it is only safe to conclude that while an intervention program may be successful at producing cross-situational increases in safety belt use, it is doubtful that longer-term generalization will occur without additional interventions and/or a particularly supportive milieu. Perhaps a state-wide BUL provides the necessary environmental and societal support to maintain the effects of a safety belt intervention program. To study this, we plan to replicate this study during the Summer of 1988, in the supportive context of the recent Virginia BUL. We also plan to implement and evaluate innovative safety belt programs at the community skating rink and Burger King of Blacksburg.

The safety belt interventions implemented at three swimming pools illustrated the feasibility of involving the community in supporting safety belt use. The model for a community-based program (i.e., location + agent + sponsor = program recipient) was illustrated by this and the other intervention strategies evaluated in this paper. Indeed, each of the programs (i.e., in the Montessori school, at the sites for summer recreation programs, and at the swimming pools) were practical for implementation by indigenous personnel, and each received donations from community sponsors. Our evaluation of the swimming pool programs indicated advantages of adding extrinsic rewards to the program. In particular, the pools that included extrinsic rewards for the children in their program showed much greater impact than the pool program with a reward contingency for only the lifeguards. Further, when the rewards were contingent on the children being buckled up rather than for displaying a buckle-up promise card, the program had significantly greater, immediate impact. On the other hand, the most prominent decrease in belt use during the Withdrawal phase occurred for the program with the buckle-reward contingency. The Withdrawal data was limited, however, because the pools closed for the season. Therefore, follow-up research is needed to study longer term post-intervention belt use as a function of reward contingencies in this community setting. Hence, a critical outcome of this research is the identification of a clear need for more research to define the parameters for obtaining enough extrinsic control (e.g., rewards)

to initiate the buckle-up response, but not too much so as to obviate the perceived internal control and intrinsic justification that can influence maintenance of the target behavior.

ACKNOWLEDGEMENT

The author is grateful for the special assistance of his graduate students: Galen Lehman, Robert Evans, and Michael Gilmore, and for the donations of intervention rewards and materials by Aztec Rental, Inc., Burger King of Blacksburg, Ford Motor Company, Nabisco Inc., Lee Ralph's Sporting Goods, Wendy's of Radford, and the Virginia Department of Motor Vehicles. The research was supported by Grant #R49CCR302635-01 from the Centers for Disease Control, Atlanta, GA.

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