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IMPROVING THE DRIVING PRACTICES OF PIZZA DELIVERERS: RESPONSE GENERALIZATION AND MODERATING EFFECTS OF DRIVING HISTORY

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A practical intervention program, targeting the safety belt use of pizza deliverers at two stores, increased significantly the use of both safety belts (143% above baseline) and turn signals (25% above baseline). Control subjects (i.e., pizza deliverers at a third no-intervention store and patrons driving to the pizza stores) showed no changes in belt or turn signal use over the course of 7-month study. The intervention program was staggered across two pizza stores and consisted of a group meeting wherein employees discussed the value of safety belts, received feedback regarding their low safety belt use, offered suggestions for increasing their belt use, and made a personal commitment to buckle up by signing buckle-up promise cards. Subsequently, employee-designed buckle-up reminder signs were placed in the pizza stores. By linking license plate numbers to individual driving records, we examined certain aspects of driving history as moderators of pre- and postintervention belt use. Although baseline belt use was significantly lower for drivers with one or more driving demerits or accidents in the previous 5 years, after the intervention these risk groups increased their belt use significantly and at the same rate as drivers with no demerits or accidents. Whereas baseline belt use was similar for younger (under 25) and older (25 or older) drivers, younger drivers were markedly more influenced by the intervention than were older drivers. Individual variation in belt use during baseline, intervention, and follow-up phases indicated that some drivers require more effective and costly intervention programs to motivate their safe driving practices.

DESCRIPTORS: safety belt use, response generalization, driving history, multiple baseline design, corporate safety

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The pizza delivery business, famous for its "fast and free" delivery, has gained a reputation for being fast and reckless. Indeed, some cities have not allowed certain pizza delivery operations to do business in their communities for fear of increased traffic risk. Pizza deliverers have been reported on national television to have an accident rate three times the national average (*Inside Edition,* 1989); this presents a serious public health problem when considering that, for one national chain alone, more than 100,000 pizza deliverers are on the road during a typical Friday night (*Inside Edition,* 1989). In addition, these drivers represent particularly high-risk drivers (i.e., they are mostly males between the ages of 16 and 25) who are driving during the riskiest time periods (i.e., 5:00 p.m. to 2:00 a.m.) of the day (e.g., Baker, O'Neill, & Karpf, 1984; Simpson & Mayhew, 1987).

Pizza delivery drivers are typically paid a commission on every pizza they deliver and usually receive a gratuity from their customers. Therefore, the faster they make their deliveries and return to the store, the more opportunities they have to earn money. From a contingency management perspective, one anticipates that making pay contingent on frequent deliveries would increase the occurrence of behaviors that reduce the amount of driving time, including driving at higher speeds. This monetary contingency is also likely to discourage specific safe driving practices (e.g., safety belt use) that are perceived to increase driving time. Given that many

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delivery corporations are hesitant to give up their commission-based pay format, effective intervention programs are needed in these occupations to motivate the occurrence of specific driving behaviors that decrease driving risk.

The development of practical safety programs for driving-related occupations is an especially timely applied research concern, particularly because the U.S. Department of Labor and the Occupational Safety and Health Administration (OSHA) recently released a federal standard to mandate that organizations require safety belt use by their employees while driving a motor vehicle on the job and must "implement an employee driver safety awareness program" (U.S. Department of Labor, 1990, p. 28728). It is estimated that the use of a safety belt in a vehicle accident reduces the chances of death or serious injury by 50% or more (Bohlin, 1967). In addition, industry can substantially curtail wage compensation, insurance costs, and productivity losses by adopting effective motivational programs to increase safety belt use among employees (cf. Geller, 1985). This is particularly true among growing delivery-oriented businesses. However, the consequences of not using a safety belt are realized only during the improbable occurrence of an accident and therefore are not as salient as the contingency of more immediate pay for quick deliveries. This study addresses this problem by evaluating a practical work-based intervention program that included a group meeting, verbal and written activators, and a personal commitment strategy.

To date, studies that have examined changes in safety belt use among individuals recorded a driver's belt use only once or twice per day when arriving at and departing from a certain event (e.g., work, Geller, 1983; Geller & Hahn, 1984; school, swimming lessons, and day care, Geller, 1989b). In contrast, the pizza deliverers at our target sites made up to 12 arrivals and departures per hour; therefore, we were able to observe individual drivers several times during one observation period. By linking license plate numbers observed in the field with those in the employee files, we were able to group subjects according to certain individual characteristics, including age and driving record. This enabled an examination of certain individual characteristics as potential moderators of intervention impact.

METHOD

Participants and Settings

Pizza deliverers from three different pizza stores were observed departing for and returning from their deliveries. Two stores were located in a college town with 33,851 residents (Blacksburg, Virginia). One store (Blacksburg 1) had 53 drivers, ranging in age from 19 to 42 years ($M = 24.6$) and having completed an average of 3 years in college. A second store (Blacksburg 2) was used as a nontreatment control and was operated by a different pizza enterprise. Demographic information could not be obtained on the 34 pizza deliverers at this store. The third store was in a nearby semirural town with 14,914 residents (Christiansburg, Virginia). The Christiansburg store had 28 drivers, ranging in age from 18 to 38 years ($M = 23.2$) with an average education of 1 year of college. Both Blacksburg 1 and the Christiansburg store are owned by the same franchise.

Pizza deliverers at these stores work on commission (per total pizzas sold), which averages approximately 58¢ per delivery plus gratuity. At the time of the study, Virginia had a safety belt use law in effect, with secondary enforcement and a $25 fine for convicted violators. Prior to the study, the employee procedures manual for the treatment sites included a five-item road safety and courtesy section that did not specify safety belt use.

Observation Procedures and Data Collection

The use of safety belts and turn signals by delivery vehicle drivers was unobtrusively recorded during peak business hours (from 5:00 to 8:00 p.m.). Observations were conducted from strategic positions overlooking the parking area of each pizza store. Customers driving their vehicles in and out of the stores' parking lots were also observed. Large "TRAFFIC COUNT" signs, similar to those used intermittently in the area by the Department of Transportation, were placed in front of the data collectors' vehicle. Using a standard checklist, trained undergraduate research assistants recorded each pizza deliverer's shoulder belt and turn signal use while at a designated intersection. In every case, the pizza deliverer was the driver and the only vehicle occupant. To increase the ease and accuracy of identifying individual vehicles, the observers were given written descriptions of each pizza deliverer's vehicle and the corresponding license plate number. To assess interobserver reliability, two observers made independent recordings on approximately one third of the observation sessions.

At the two treatment sites, the following individual characteristics of 24 drivers were available in the employee files (including records from the Virginia Department of Motor Vehicles): (a) age, (b) number of driving demerits over the prior 3 years, (c) number of years without a moving violation, (d) number of speeding violations during the previous 5 years, and (e) number of accidents during the previous 5 years. These data were recorded per driver according to license plate number, matched to the license plate numbers of the behavioral observations, and then given an arbitrary but distinct research code. Subsequently, the license plate numbers were removed from the data, eliminating any link to individual names.

Experimental Design and Intervention

The design was conceptualized as a multiple baseline across two settings with an untreated control group (cf. Geller, Winett, & Everett, 1982). After a baseline observation period, an intervention to increase safety belt use was implemented at Blacksburg 1, while baseline observations continued at the second and third stores. This intervention was then implemented 3 weeks later at the Christiansburg store, while the third store remained in a baseline condition. No contact was made with the personnel at the third store (Blacksburg 2). As detailed below, the intervention included two phases: (a) a group awareness and consensus-building session and (b) store-based reminder techniques. Similar approaches to safety belt promotion have been applied successfully at industrial plants (Cope, Grossnickle, & Geller, 1986; Geller & Hahn, 1984; Kello, Geller, Rice, & Bryant, 1988). All store-based reminders were then removed from the experimental sites and data collection ceased for 2 weeks (during the Christmas holidays). Subsequently, 11 weeks of follow-up data were collected.

Although there were 115 drivers for the three experimental sites, only 75 qualified for our analysis using the following criteria. Individuals who were observed less than three times during a session were dropped from the analysis for that session. Furthermore, if fewer than 3 individuals with the above criteria were observed during an observation session, that day was eliminated from the overall analysis. Finally, individuals meeting the above criteria for fewer than three sessions during both the baseline and intervention phases were eliminated from this analysis. Using these guidelines, data are reported on 33 drivers from Blacksburg 1, 18 drivers from Blacksburg 2, and 24 drivers from Christiansburg. Of these subjects, 14 were never observed during follow-up.

Safety belt awareness and consensus building. This 1-hr session occurred on a Saturday morning and consisted of an interactive group discussion among the pizza deliverers, cooks, and managers. Of the 33 drivers at the Blacksburg 1 store whose data were used for analysis, 26 were present at the awareness session. Of the 24 drivers at the Christiansburg store whose data were used for the analysis, 16 were present at the awareness session.

The awareness sessions were led by different group facilitators at the Blacksburg and Christiansburg stores. The second author, a male in his mid-40s with a PhD who has delivered over 100 similar sessions, was the group facilitator at the Blacksburg location. At the Christiansburg location, the group discussions were facilitated by the first author, a male in his mid-20s with a MA in experimental psychology. This was his first experience at leading such a session, although he had attended the Blacksburg session 3 weeks earlier and had received group process tips from the second author. The second author did not attend the Christiansburg program.

The discussion leaders (one per store) facilitated coverage of the following items:

1. It is the policy of the pizza corporation that refusing to use a safety belt can result in termination of employment.

2. In the event of an accident, it is impossible to hold yourself back from the dashboard; even at 25 mph you will hit the windshield at about the same force as falling out of a three-story building.

3. It is not safer to be thrown clear of your vehicle in an accident.

4. Even in accidents involving fire or water immersion, it's best to be strapped safely behind the wheel where you are more likely to remain without injury and be conscious enough to exit the vehicle.

5. Most vehicle accidents occur on short trips.

6. Using a safety belt can improve driving performance because you're held securely behind the operating controls of your vehicle.

7. Professional drivers set an example for others by buckling up. Pizza deliverers are highly visible and can influence the way other people drive. They also influence the public's perception of the company, which in turn affects store business.

The facilitator presented these issues and other relevant statistics to the group and then asked the employees why each point is especially relevant to pizza deliverers. If discussion didn't ensue immediately, the facilitator added a related comment or query to stimulate reaction and comment.

During the second part of the meeting, the facilitator reported data, collected that morning as the participants arrived at the program site, on the group's current percentage of safety belt use. Next, the facilitator asked the employees whether it was their desire to increase their safety belt use; when employees answered affirmatively, he asked them how they proposed to do it. After an employee made a suggestion, the facilitator shaped it into practical store-based intervention ideas to increase safety belt use. This active role of the facilitator assured that the store-based interventions were the same at both the Blacksburg 1 and Christiansburg stores.

Finally, the employees were asked to make a commitment to buckle up by signing a buckle-up promise card (see Geller & Lehman, 1991). These promise cards included a stub that could be signed and detached. The stubs were collected in a bowl and a prize raffle for a $32 company sweatshirt was conducted. All of the employees at both treatment stores signed a promise card and entered the raffle. After a winner was selected, the employees were thanked for their participation and dismissed.

On the day of the session, observations of belt use at the Blacksburg 1 store indicated 42% safety belt use for the group when arriving for the session; when departing, participants' belt use was 100%. Both of these percentages were obtained obtrusively, with the session leader and two assistants standing in front of the store with clip boards. Six hours later, regular data collection continued unobtrusively. Postmeeting observations of belt use were not made at the Christiansburg store.

Store-based reminders. On the Monday following the awareness sessions, prompting techniques were initiated in the respective pizza stores to remind the employees of their commitment to buckle up. More specifically, safety belt reminder slogans solicited from the employees during the awareness sessions were displayed on signs located above the delivery preparation table and beside the door where deliverers exited. They were placed in the stores 2 days after the awareness session at each location and were removed from both stores prior to the follow-up observations. Also, the dispatchers and cooks reminded the drivers to buckle up as they left the store to make their deliveries. Before leaving the store with a pizza, deliverers typically call out the time left on a "30-minutes-or-less" delivery guarantee. Then the dispatchers call this time back to the driver; however, as part of the intervention, the dispatcher also yelled "buckle up" to the departing driver. The store managers took frequent but nonsystematic samples of this verbal behavior and reported that the drivers were verbally reminded to buckle up about 33% of the time in the Blacksburg store and 20% of the time in the Christiansburg store. No reliability data were collected on these counts of verbal reminders.

RESULTS

Interobserver Reliability

Of 7,533 total vehicle observations, 37% were recorded independently by two observers. Interobserver agreement percentages were defined separately for occurrences and nonoccurrences of the target behaviors (i.e., use of shoulder belts and turn signals) and were calculated by dividing the total number of observations agreed upon for a particular data category by the total number of agreements and disagreements and multiplying the result by 100. Interobserver agreement averaged 90.8% for belt use (range, 78.3% to 97.6%), 90.1% for belt nonuse (range, 80.0% to 95.1%), 92.7% for turn-signal use (range, 77.3% to 100%), and 84.6% for turn-signal nonuse (range, 47% to 100%).

Overall Effects

Safety belt use. Individual drivers were observed getting in or out of their vehicles from 1 to 17 times per observation session, resulting in a mean of 7.5 observations per individual each evening at Blacksburg 1, 8.2 at Christiansburg, and 7.8 at Blacksburg 2. At Blacksburg 1, an average of 72.3 vehicle observations occurred in a single observation session, whereas at Christiansburg, an average of 36.7 vehicles were observed per evening; at Blacksburg 2 this average was 42.1. Most deliverers used their own vehicles for deliveries, and all but one of these vehicles were equipped with shoulder belts. The vehicle without front-seat shoulder belts was not included in the data analysis. In addition, one vehicle from each location was owned by the franchise and, because different employees used these vehicles, observations of these vehicles were used only for the overall group analysis.

Figure 1 depicts the daily percentages of safety belt use by pizza deliverers at the three sites from September 1988 to March 1989. The mean daily safety belt use was determined by calculating the mean belt use percentage for each observed vehicle and then calculating the average of these vehicle means. The mean for each experimental phase represents the average of all daily means during that phase. Mean safety belt use during 1,842 baseline observations at Blacksburg 1 was 41% (range, 25% to 64% per session). Mean belt use for the 1,437 intervention phase observations at Blacksburg 1 was 68% (range, 55% to 88%). During the 1,235 follow-up observations at Blacksburg 1, mean belt use was 69% (range, 36% to 89%).

At the Christiansburg store, mean belt use during 1,290 baseline observations was 14% (range, 0% to 52%). Mean belt use during the 150 intervention phase observations was 69% (range, 52% to 87%). During 299 follow-up observations, mean belt use was 41% (range, 15% to 67%). Mean belt use during the 1,656 total observations conducted at the control site (Blacksburg 2) was 45% and did not vary systematically as a function of any experimental manipulations at the target stores. Similarly, the mean percentage of safety belt use among the customers driving their vehicles in and out of the store parking lots was 55% during 354 baseline observations, 50% during 50 intervention observations, and 57% during 92 follow-up observations. Thus, these control vehicles showed consistent safety belt use across phases.

The 26 employees who attended the Blacksburg 1 awareness session had a baseline belt use mean of 46%, an intervention mean of 74%, and a follow-up mean of 76%. In contrast, the remaining 7 employees at the Blacksburg 1 store whose data were used in analysis but who did not attend the actual awareness session had a baseline belt use mean of 33%, an intervention mean of 64%, and a follow-up mean of 59%. The 16 employees whose data were used in the analysis and who attended the Christiansburg awareness session had a baseline belt use mean of 7.5%, an intervention mean of 62%, and a follow-up mean of 23%. The 8 employees who did not attend the awareness session had a baseline belt use mean of 18%, an intervention mean of 75%, and a follow-up mean of 42%.

Turn-signal use. Figure 2 depicts the daily percentages of turn-signal use among the drivers included in the safety belt analysis. At the Blacksburg 1 site, mean turn-signal use was 58% during 652 baseline observations, 74% during 376 observa-

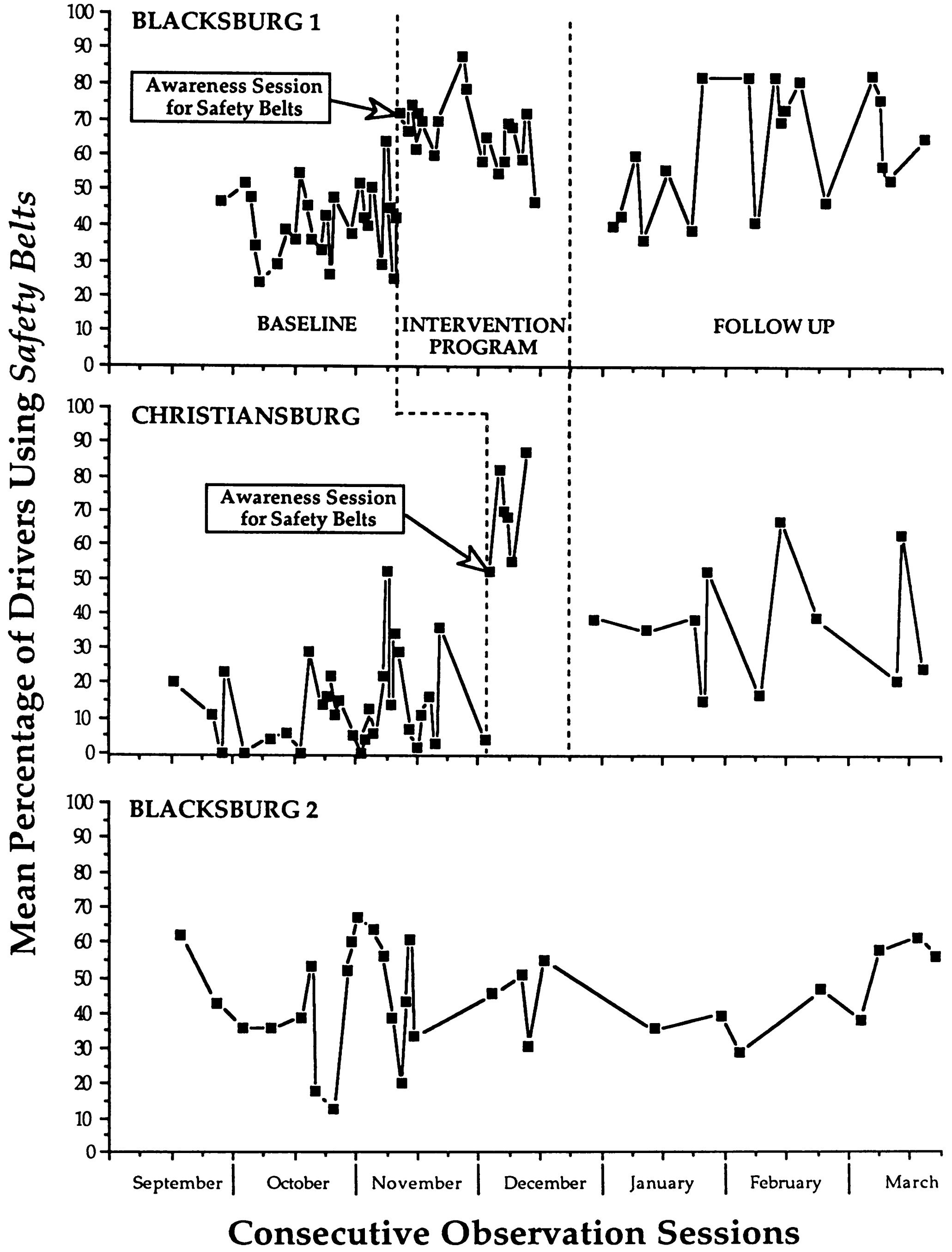

Figure 1. Mean percentage of safety belt use among pizza deliverers at the Blacksburg and Christiansburg sites during baseline, intervention, and follow-up phases.

tions in the safety belt program, and 65% during 655 follow-up observations. At the Christiansburg store, mean turn-signal use was 40% during 708 baseline observations, 49% during 83 intervention phase observations, and 45% during 151 follow-up observations. At Blacksburg 2 (the nontreatment control site), mean turn-signal use was 59% during 688 total observations and did not vary

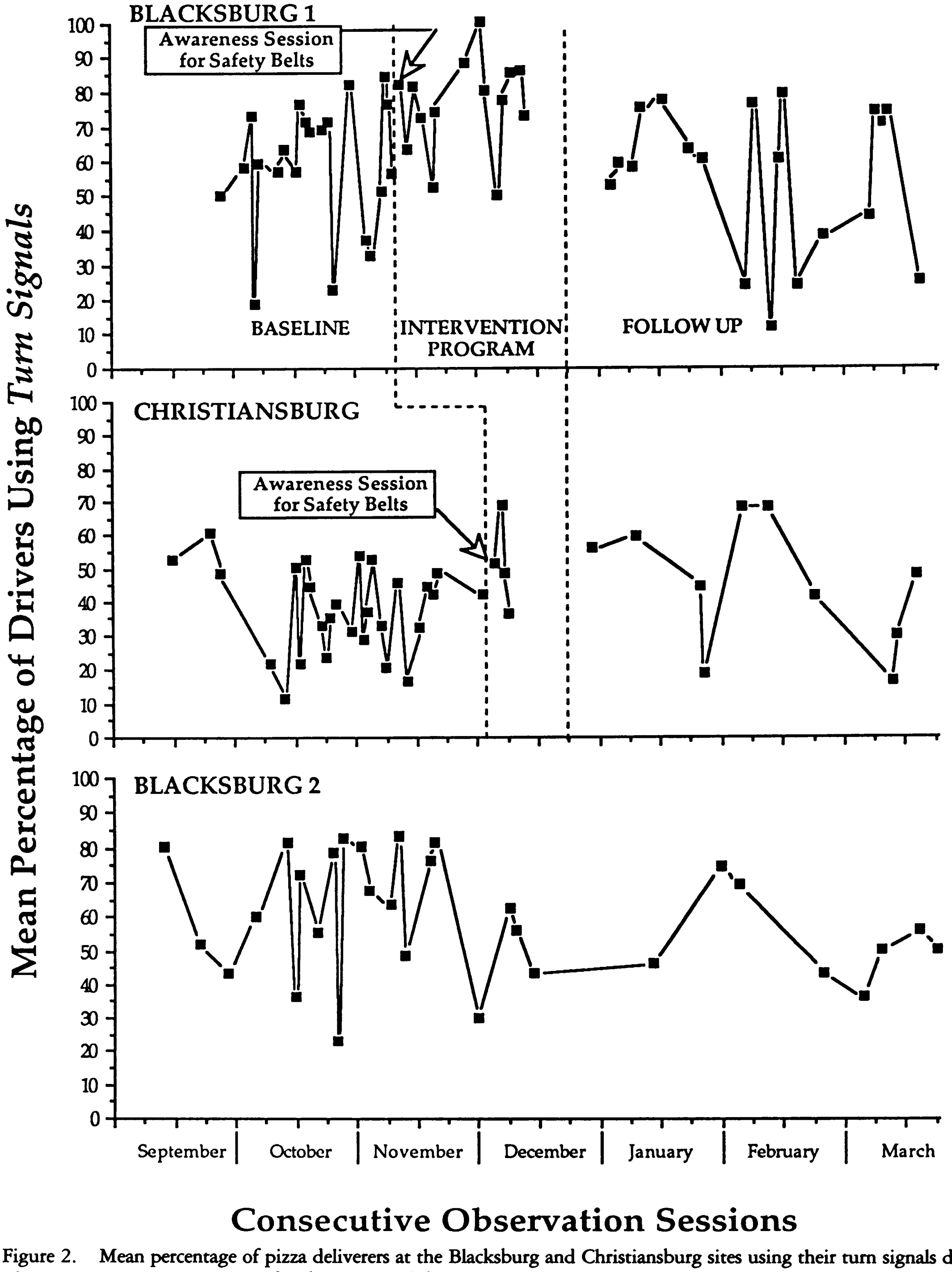

Figure 2. Mean percentage of pizza deliverers at the Blacksburg and Christiansburg sites using their turn signals during baseline, intervention to increase safety belt use, and follow-up phases.

systematically as a function of any experimental manipulations at the target stores. The mean percentage of turn-signal use among the customer vehicles was 52% during 373 baseline observations, 53% during 60 intervention observations, and 52% during 52 follow-up observations. Thus, consistent turn-signal use was observed among these control vehicles across phases.

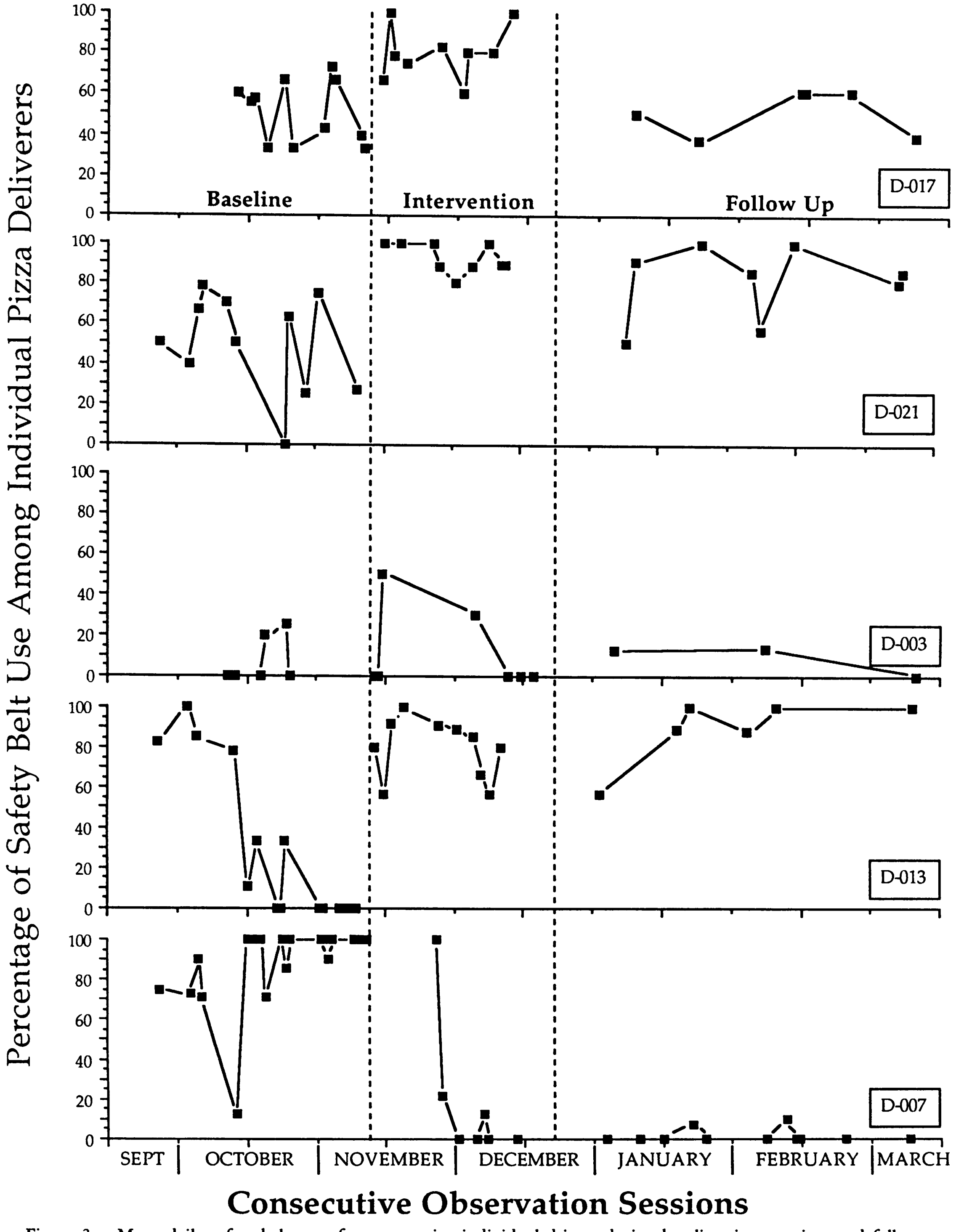

Figure 3. Mean daily safety belt use of representative individual drivers during baseline, intervention, and follow-up phases.

Following the intervention programs, 62% of the pizza deliverers increased their use of turn signals 10 percentage points or more whereas the remaining 38% showed a decline or no difference in turn-signal use. At least a 20 percentage point increase in turn-signal use was observed for 41% of the employees. A significant correlation was obtained between individual safety belt use and use of turn signals during baseline ($r = 0.42$, $p < .05$) but not during the intervention phase ($r = 0.08$, $p > .10$). Similarly, a chi square analysis indicated significant covariance between safety belt use and use of turn signals in baseline ($\chi^2 = 33.4$, $p < .001$) but not during the intervention phase ($\chi^2 = 5.4$, $p > .05$).

Individual Data

Over the 6-month course of the study, observations were recorded several times a day per individual driver. Three distinct patterns emerged from a review of the data for most individual drivers at Blacksburg 1 ($n = 33$) and Christiansburg ($n = 24$). Of these 57 drivers, the daily belt use of 14 drivers observed within each phase was so variable that a consistent pattern could not be observed. Figure 3 depicts these three patterns with the belt use of the individuals who contributed the greatest number of observations per pattern. Figure 3 also depicts the belt use of 2 drivers whose behavior did not fit the three patterns but did show noteworthy fluctuations in safety belt use. Eight drivers showed the general pattern of Driver 017, in which an increase in safety belt use during the intervention was followed by a return (i.e., reversal) to the preintervention baseline level during follow-up. Nineteen drivers showed the pattern of Driver 021, who demonstrated an increase in belt use during the intervention phase and belt use during follow-up that was at least 50% higher than baseline levels. Twelve drivers showed slight or no increase in safety belt use during the intervention, as depicted by the data for Subject 003. In every case these drivers had baseline belt use levels below the group baseline mean of 40%. It is noteworthy that only 3 of these drivers had attended the awareness session. Driver 013 was first observed 10 days after beginning his employment. Over the next four observation sessions (covering 15 days), this employee averaged 88% belt use. However, during the 10 remaining observations of the baseline period (24 days), this driver's mean belt use dropped to 8% (7 of the 10 observation session averages for this period were 0%). Then, an increase to a mean of 80% belt use occurred during the intervention phase (range, 57% to 100%), and a substantial increase in this driver's belt use continued during the follow-up phase. Subject 007 showed a dramatic decrease in his belt use rate 18 days into the intervention and remained near 0% throughout the follow-up period.

Age and Driving History as Moderators

From the employee files of the two treatment stores, five variables were examined for 24 drivers whose files were available and who were observed three or more times on 3 or more days within each experimental phase. These variables were (a) the age of the employee at the time of the intervention; (b) the number of traffic violations recorded as demerits (including all legal, vehicle, and moving violations) on the employee's motor vehicle report over the previous 3 years; (c) the number of concurrent years without a demerit, recorded as safe driving points; (d) the number of accidents, regardless of fault, over the previous 5 years; and (e) the number of convicted speeding violations over the previous 5 years.

Each of these variables was subdivided into risk or nonrisk categories, and the drivers were assigned to groups accordingly. Risk groups included individuals who (a) were under age 25, (b) had one or more demerits on their driving record, (c) had not driven 1 year without a moving violation, (d) had one or more recorded vehicle accidents within the previous 5 years, or (e) had one or more speeding violations within the previous 5 years. The average overlap of individuals between two risk (or nonrisk) groups was 41%. The greatest overlap of individuals (50%) was found between those who had demerits on their record and those who had speeding violations; the least overlap of individuals (29%) occurred between those who had demerits on their records and those who had one or more accidents.

Safety belt use percentages for each risk and

Table 1
Mean Percentage Safety Belt Use during Baseline and after the Awareness Session as a Function of Individual Characteristics Related to Driving Risk

Individual factor	Categories and sample size	Baseline safety belt use	Postawareness safety belt use	χ^2
Age	under 25 (n = 15)	42%	63%	75.4*
	25 and older (n = 9)	51%	47%	0.16
Demerits	≥1 (n = 9)	33%	52%	57.1*
	0 (n = 15)	51%	72%	84.6*
Safe driving points	0 (n = 9)	28%	76%	163.0*
	≥1 (n = 15)	58%	69%	3.4
Accidents	≥1 (n = 7)	51%	68%	18.1*
	0 (n = 17)	42%	72%	149.6*
Speeding violations	≥1 (n = 9)	49%	65%	75.0*
	0 (n = 15)	46%	79%	51.4*

*$p < .001$.

nonrisk individual were obtained by summing the daily means during baseline and after the awareness session for each driver, and then dividing by the total number of days the individual driver was observed during the respective period. For each classification, the average of the drivers' mean belt use percentages (collapsed across the two treatment sites) in a given category (risk vs. nonrisk) was calculated to give average percentage belt use before (i.e., baseline) vs. after the awareness session (i.e., intervention and follow-up phases).

Table 1 shows the mean safety belt use during baseline and after the awareness session for each risk and nonrisk category. The within-group chi square statistic across the two phases, also shown in Table 1, revealed significant increases in safety belt use in all but two groups. The notable exceptions were the group of individuals over 25 and those who had gone at least 1 year without a driving violation (i.e., safe driving points), both having been designated as nonrisk groups.

Additional chi square comparisons were made between groups within the baseline and postawareness phases. No significant difference was found ($\chi^2 = 6.3, p = .10$) between the mean safety belt use for the risk and the nonrisk age groups during the baseline phase. After the awareness session, however, the belt use of drivers in the risky age category was significantly higher than the drivers who were 26 or older ($\chi^2 = 25.0, p < .001$).

Those with no demerits had mean baseline belt use 18 percentage points higher ($\chi^2 = 23.7, p < .001$) than those who had one or more demerits on their driving records. After the awareness session, the nondemerit and demerit groups still differed significantly in their belt use ($\chi^2 = 31.6, p < .001$), thereby increasing their belt use at equivalent rates. There was a significant 30 percentage point baseline difference between those who had 1 or more years of safe driving at the time and those who did not ($\chi^2 = 90.6, p < .001$). After the awareness session, however, belt use of these groups increased to levels different by only 7 percentage points ($\chi^2 = 4.7, p = .26$).

Those who had no accidents on their driving records showed a baseline belt use mean only 9 percentage points higher than those who had accidents on their driving records ($\chi^2 = 6.2, p = .10$); after the awareness session these groups increased their safety belt use markedly to similar levels ($\chi^2 = 1.6, p = .98$). Also, no differences were found between risk and nonrisk groups with respect to speeding violations in baseline ($\chi^2 = .55, p = .92$). However, after the awareness session those with no speeding violations buckled up significantly more often than those who had a speeding violation on their driving records ($\chi^2 = 28.3, p < .001$).

These comparisons between risk groups within and between phases were made using the group means presented in Table 1. We also computed the mean of individual drivers' means per risk group and phase. No notable differences between the two types of calculations were found except between the postawareness belt use of those who had a speeding violation and those who had not. Specifically, although Table 1 shows a significant 14 percentage point difference between these groups, when taking the mean of the individual drivers' means, both groups showed an identical 68% belt use during this phase.

DISCUSSION

This study demonstrated the efficacy of an inexpensive and practical intervention program (including a group awareness and consensus-building session and store-based buckle-up reminders) designed to motivate pizza deliverers to use their safety belts during delivery trips. During follow-up, mean safety belt use did not return to baseline levels. Instead, approximately half of the overall increase in safety belt use remained after the in-store cues were removed. Although the reminder signs were removed from the setting, the practice of reminding drivers to buckle-up as they departed for their deliveries could not be controlled. Thus, it is possible that the maintenance effect during follow-up was partially due to some verbal buckle-up reminding among peers.

Because the awareness session included a solicitation of participants' ideas for increasing their own safety belt use, this group session resulted in consensus-building discussions of various intervention ideas. Some of these ideas were used later as store-based buckle-up reminders. Similar group discussion interventions were effective in increasing safety belt use among company employees (e.g., Cope et al., 1986; Geller & Hahn, 1984; Kello et al., 1988). Each of these programs also used a promise card commitment strategy similar to that applied in the current study (see Geller & Lehman, 1991) and did not use incentives or rewards. Similar group discussions regarding other unsafe driving practices (e.g., speeding, close following distances, or rolling stops at intersections) and their safe alternatives might have beneficial impact and result in useful intervention ideas for influencing additional safe driving practices.

A comparison of those employees who attended the awareness session with those who did not showed no systematic differences. The greater than 10 percentage point difference between those who attended the awareness session at the Blacksburg 1 store and those who did not, as well as the high follow-up mean of those who attended the awareness session, was not replicated at the Christiansburg store. However, the Christiansburg employees who did not attend their awareness session had higher percentages of safety belt use in all phases. Because of the differing results across two experimental sites, we must conclude that there was no consistent effect of attendance at the awareness session.

The prominent increase in safety belt use during the 5th week of follow-up (i.e., last point in January on Figure 1) occurred at the same time a national television program (*Inside Edition,* 1989) televised an investigative report concerning recent deaths allegedly caused by drivers working for a national pizza delivery corporation affiliated with the franchise owning the Blacksburg 1 and Christiansburg stores. Interviews with the owners and managers of this franchise indicated that all employees knew of this program and had discussed it in group meetings.

Although our intervention program targeted only safety belt use, a moderate but statistically significant increase in the use of turn signals was observed at the two intervention sites. Evaluations of behavior change programs rarely include observations of behaviors other than the target behavior. Therefore, response generalization is not often explored in the applied behavior analysis literature. In fact, Stokes and Baer (1977) mentioned only a few examples of this type of generalization in their instructive article on generalization technology. Thus, we argue that the response generalization observed in this study represents something more than simply a failure to apply tight control of the stimuli and responses involved. The evaluation of changes in a behavior other than the target behavior is, in fact, the sort of ecological behavior analysis advocated by several authors (e.g., Geller, 1987; Gump, 1977; Willems, 1974, 1977).

Theory and empirical research suggest two possible changes in turn-signal use following an increase in a driver's use of a safety belt. The theory of risk homeostasis (Wilde, 1982), supported by limited field research (Streff & Geller, 1988), suggests that increased perceptions of safety or security following the increased use of one's safety belt could cause an increase in risky driving, possibly reflected in a decrease in the use of turn signals. On the other hand, response generalization notions predict an increase in turn-signal use following an increase in belt use, because both of these behaviors are conceptually in the same class of safe driving responses. The response generalization observed in this study may be a special benefit of programs motivating behavior change with minimal extrinsic controls. In fact, a similar result was found by Streff and Geller (1987). After a group discussion session with promise cards targeting the use of personal protective equipment (i.e., protective gloves, safety glasses, and ear plugs) on the job, employees more than doubled their use of vehicle safety belts when departing the company parking lot (from 12.8% during baseline to 35.1% after the occupational safety intervention).

By observing the same drivers repeatedly during the same observation sessions we were able to study individual differences in responsiveness to a corporate-based intervention as a function of certain factors related to risk taking. According to the propositions of problem behavior theory (Jessor, 1987; Melton, 1988; Wilson & Jonah, 1988), those individuals most resistant to less intrusive interventions are most likely to emit the most damaging (or risky) behaviors. Our categorization of drivers according to age did not support this notion. Specifically, as a group, pizza deliverers under age 25 showed the same baseline rate of belt use as their fellow employees who were 26 and over; only the group under 25 (i.e., the risk group) showed a significant increase in belt use as a result of the intervention. This suggests that the age group singled out by insurance companies as the highest risk may actually be more receptive than older individuals to the type of behavior-change intervention program implemented in this study (at least with regard to safety belt promotion). The phrase "you can't teach an old(er) dog new tricks" was perhaps relevant for this sample of pizza deliverers. Although the number of field observations per subject was substantial (e.g., averaging more than 34 observations per subject per phase at the Blacksburg store), the number of individuals in the older age group was small (only 9); thus, this provocative finding requires further investigation, including the examination of driving practices other than safety belt use.

Consistent with problem behavior theory, individuals who had demerits or accidents on their driving records showed significantly lower belt use compared to their counterparts who had no demerits or accidents. Even though the belt use of these risk groups increased at the same rate as the nonrisk groups, their belt use remained significantly lower after the intervention program, suggesting that individuals with demerits or accidents in their recent driving history are less likely to buckle up than those without demerits, even after an intervention program to increase belt use. In contrast, when risk was defined by a lack of safe driving points, a different pattern emerged. Whereas the predicted belt use difference occurred between risk and nonrisk groups during baseline, the risk group caught up with the nonrisk group after the awareness session. Consequently, different definitions of risk resulted in different observed relationships between variables and responsiveness to our intervention program, illustrating the need for further study of relationships between different indicators of risk and various driving practices. The results also suggest a need to consider relationships between individual risk indicators and idiosyncratic responsiveness to different types of interventions. It may prove most cost effective in the long run to match certain individual characteristics (i.e., risky vs. nonrisky lifestyles) with particular approaches to behavior change (Geller, 1989a).

The multiple intervention level (MIL) hierarchy proposed by Geller et al. (1990) is characterized by dividing intervention strategies into multiple tiers or levels, each defined by certain dimensions of intervention effectiveness. At the first (i.e., bottom) level of the MIL hierarchy, the interventions are least intrusive and target the maximum number of people for the least cost per person. For the present research, one could consider Virginia's safety belt use law (BUL), in effect at the time of this study, to be a lower level intervention compared to the intervention program evaluated herein. The intervention program in this study was conceptually more intrusive (i.e., higher agent-to-target ratio, more subject participation, more peer support, more salient response information, and more immediate and relevant control features) than Virginia's BUL, and thus would be considered a higher level intervention by Geller et al. (1990). Numerous vehicle occupants (about 50% of the U.S. population) do not buckle up in the context of belt use mandates; therefore, more effective, higher level interventions are needed for these individuals. For example, only 9 subjects in our sample had safety belt use percentages above 70% during baseline, which occurred in the context of a BUL imposed upon the population 10 months earlier; but during our intervention program, 24 pizza deliverers had belt use percentages exceeding 70%.

Whereas most pizza deliverers increased their belt use after the intervention program, several individuals showed no beneficial effects of the intervention. Some drivers who increased their belt use during the intervention phase continued the desired behavior after the intervention was withdrawn. For example, Driver 021 was one of 19 individuals who showed maintenance of increased belt use (see Figure 3). However, there were 8 drivers who, after showing an initial increase in the target behavior, decreased their belt use substantially (e.g., Driver 017 in Figure 3). These employees might benefit from repeated exposure of a similar intervention (i.e., booster sessions). Twelve other individuals (e.g., Driver 003 in Figure 3) showed no change in belt use as a result of our intervention program. Following the MIL model (Geller et al., 1990), we presume that those individuals uninfluenced by an intervention at a given level of effectiveness (and cost) will be uninfluenced by repeated exposures to interventions at this same level. Successively higher intervention levels are more costly and intrusive, but these are presumably needed for the "hard-core" problem individuals unaffected by less expensive and effective interventions (e.g., Drivers 003 and 007 in Figure 3).

In conclusion, individual patterns of safety belt use indicated that group averages often hide individual response variability worthy of scientific investigation. In fact, it might have proven instructive to interview certain subjects (e.g., Driver 007) and explore idiosyncratic reasons for dramatic fluctuations in safety belt use. Furthermore, an analysis of personality, lifestyle, and attitudinal factors may offer explanations for behavioral variability. Moreover, it might have been worthwhile to categorize drivers according to individual amounts of participation during the awareness sessions and to study intervention effects as as function of these differences. At any rate, it is clear that a behavior change intervention can have a wide range of influence across individuals (on both target and nontarget behaviors), and information relevant to matching intervention characteristics with individual factors is needed in the public health domain (Geller, 1989a). This study introduced some new methods in the domain of driving-related injury control and presented noteworthy findings. The results support a need to venture beyond short-term demonstration projects and (a) develop a taxonomy of behavior change techniques according to the relative effectiveness of particular behavior change strategies, (b) examine individual differences with respect to the influence of particular intervention programs, (c) apply more effective (and more expensive) behavior change programs to those individuals uninfluenced by less effective interventions, and (d) study potential response generalization outcomes of injury control interventions. Such important applied research is feasible with further applications of the methods used in the present research.

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