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CASE STUDY

Attempts to Increase Vehicle Safety-Belt Use Among Industry Workers: What Can We Learn from Our Failures?

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ABSTRACT. A multiple intervention level hierarchy was evaluated with systematic implementation of successive interventions over a period of two years. Successive applications of written prompts, goal-setting, goal-setting plus feedback, and promise-card commitment interventions did not significantly impact the safety-belt use of 556 employees at a

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manufacturing plant in southwest Virginia. A modest increase in safety-belt use (from 59% to 68%) occurred only when a promise-card commitment strategy was combined with an incentive/reward strategy. These data support a multiple intervention level hierarchy which suggests that repeated attempts to change behavior with interventions at the same level of intrusiveness will not affect behavior uninfluenced by the first attempt at that level. A flow of behavior change model (Geller, 1999) is used to explain the impact of interventions on people at different stages of readiness for behavior change and to extend the multiple intervention level model. Suggestions are given for selecting the most appropriate behavior change strategy for large-scale applications. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworthpressinc.com <Website: http://www.haworthpressinc.com>]*

KEYWORDS. Safety, safety belt use, written prompts, safety slogans and celebration, assigned goal, goal plus feedback, promise card, promise card plus incentive/reward

At-risk driving is a serious public health problem in contemporary society. In 1996 there were 41,907 fatalities and 3.5 million serious injuries due to vehicle crashes in the United States. As such, approximately 115 people die each day in a motor vehicle crash. This amounts to one death every 13 minutes (National Highway Traffic Safety Administration, 1998). Ironically, these tragedies occur despite environmental safeguards designed to protect vehicle occupants and mandatory laws to control driving behavior. In fact, Geller (1991) called the U.S. highways a battleground claiming more lives than any war our country has ever seen.

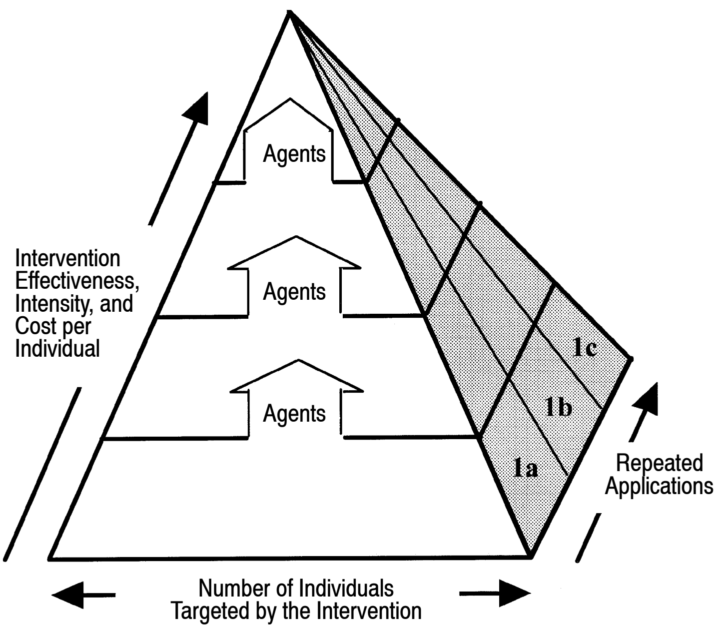
Minor changes in driver behavior can prevent injury and save lives. For example, the occurrence of vehicle crashes has been shown to be positively correlated with changes in the national speed limit (Evans, 1991). Moreover, it is estimated that safety-belt use saved 10,414 lives in 1996 and 90,425 lives since 1975 (National Highway Traffic Safety Administration, 1998). It is predicted that a one percent increase in the use of safety belts nationwide saves 200 lives per year (Nichols, 1998). Indeed, the use of shoulder and lap belts is the single most protective behavior that can be conveniently taken to reduce the risk of death or injury in a vehicle crash. Given this, it is alarming that nationwide belt use is a low 68% (Nichols, 1998).

A MULTIPLE INTERVENTION LEVEL (MIL) HIERARCHY

Over two decades of behavior change research at corporate and community sites led to the development of the *multiple intervention level* (MIL) hierarchy depicted in Figure 1. This model is used to categorize behavior change approaches and evaluate the cost-effectiveness of successive intervention strategies to change the behavior of large numbers of individuals (Geller, 1998a; Geller, Berry, Ludwig, Evans, Gilmore, & Clarke, 1990).

Those individuals influenced at a particular intervention level may benefit from repeated exposure to similar interventions (as booster sessions), but it is assumed most individuals uninfluenced by the first exposure to a particular intervention will not be influenced by repeated exposure to interventions at the same level of intrusiveness. Thus, these individuals require a higher-level (more intrusive) intervention.

FIGURE 1. The multiple intervention level hierarchy, differentiating repeated prevention interventions at the same effectiveness level and higher level interventions that are more influential at changing behavior (adapted from Geller et al., 1990).



Successively higher order interventions are more costly and presumably reach fewer people.

The MIL hierarchy is characterized by dividing intervention strategies into multiple tiers or levels, each defined by certain dimensions of intervention effectiveness derived from the three term contingency of behavior analysis. At the first (bottom) level, the interventions are least intrusive and target the maximum number of people. Interventions at this level are typically characterized as antecedent strategies (Geller, 1996). Simple antecedent strategies were called prompts in early large-scale applications of behavior analysis (Geller, Winett, & Everett, 1982). Later conceptualized as "tracks" and "plys" (Zettle & Hayes, 1982) from the work of Skinner (1957), Berry, Geller, Calef and Calef (1992) operationalized these interventions as verbal descriptions of the way events occur in the world. In other words, these antecedent stimuli operate as rules. A rule is simply a verbal description of a contingency (Malott, 1992) which sets the occasion for and shapes desired behavior in the absence of actual response consequences.

In addition, rules can promote a correspondence between saying and doing which has likely been reinforced in the past (Zettle, 1990). Lower level interventions, however, often specify incomplete rules. In this case, the three-term contingency is not explicitly stated. Lower level strategies are exemplified by periodic reminders (Ludwig & Geller, 1991). At this level the intervention is designed to have maximum large-scale appeal and minimum individual-to-individual contact.

Signing and displaying a promise card (cf. Geller & Lehman, 1991) would be an example of a Level 2 intervention. Specifically, although an antecedent strategy, a written promise is an indication that the individual understands the rule and expresses a "willingness" to follow it. It brings a group norm to the individual level and implies consequences (e.g., social disapproval) for not following the rule. As such it is a more complete description of the three-term contingency and presumably will impact individuals not impacted by a simple Level 1 prompt.

From the perspective of applied behavior analysis, higher level interventions provide successively more complete rules (i.e., they specify a response consequence) or they physically operate on the environment to produce specific contact with natural or contrived consequences following certain behaviors. Laws, policies or mandates which threaten aversive consequences are examples of more specific rules. Safety-belt use has increased significantly in almost every state that has passed a BUL (Campbell, Stewart, & Campbell, 1987, 1988).

Behavioral goal-setting plus feedback (cf. Geller, 1996) and incentive/reward programs (e.g., Geller, 1983) are also considered Level 3 interventions because they alter the specific response contingencies under which the target behavior is operating, thus influencing behavior change in desired directions. The latter, which provide the opportunities to obtain desired material consequences are "strong plys" (Zettle & Hayes, 1982) and would be predicted to be more effective at promoting behavior change than tracks or weak plys. Level 4 contingencies, such as one-to-one counseling, that are most intrusive, labor intensive, and expensive are needed for "hard core" problem individuals and it is often these problem persons who are at greatest risk for injury (Campbell et al., 1987).

The purpose of the current study was to systematically evaluate the predictive validity of the MIL with a series of progressively more intrusive (higher level) interventions to increase the use of safety-belts among plant employees. Furthermore, it was hoped that such an evaluation could provide guidelines for selecting interventions to increase safety-belt use on a large scale.

Geller, Davis, and Spicer (1983) used an incentive/reward program to increase the use of safety belts among (n = 450) employees at a manufacturing facility in southwest Virginia. Their intervention involved the delivery of flyers to drivers entering and exiting the plant parking lots. The flyers explained that a special symbol was printed on flyers given to drivers using their safety belts and certain combinations of symbols could be collected and exchanged for free dinners. The incentive flyer intervention was followed by an immediate prize condition during which buckled drivers were stopped when arriving at the plant and given coupons for a free dinner at a local restaurant. Mean use of safety belts among salary workers increased from a baseline of 17.4% to 50.6% during the intervention phase. The same incentive program only increased belt use among wage employees from a baseline mean of 3.4% to 5.5% during the intervention phase. This was the same facility studied in the present research, with the primary difference being that Virginia has instituted a mandatory BUL since the earlier Geller et al. study.

METHOD

Subjects and Setting

Subjects were 556 hourly and salaried employees at an engine bearing manufacturing plant in southwest Virginia. The population of employees ranged in age from 19 to 63 years (M = 42 years), and employee tenure at the facility ranged from six months to more than 25 years (M = 16 years). The proportion of hourly to salary workers was approximately five to one. The hours worked and workforce were stable throughout the course of the research and minimal turn-over had occurred since Geller et al. conducted their safety-belt promotion research at this site in 1982.

Data Collection

Throughout the regular work week, trained research assistants sat in two distinct parking lots of the facility during the first shift arrival, second shift arrival/first shift departure times for hourly workers, and at the arrival and departure times for salaried employees. The observation locations and schedule remained constant throughout the course of the research. Observers collected data on drivers' use of safety belts and turn signals. To assess inter-observer reliability, a second independent observer collected data with the primary observer on 30 percent of all observation sessions. Since it was impossible to record data on every vehicle entering or leaving the parking lots, the primary observer identified vehicles to observe by calling out the make and color of the target vehicle (e.g., the red pick-up) as it passed an obvious stationary landmark. For each phase of the two-year study, interobserver reliability exceeded 90% for both safety-belt and turn-signal use.

Intervention Techniques

After four weeks of baseline observations, a series of progressively more intrusive safety-belt use interventions was implemented at the facility over two years. The interventions were as described below and occurred in the order listed.

Written prompt. Attached to the paychecks of all wage employees was a flyer displaying the logo of the industry and a message selected by a safety steering committee of wage workers which read: "We Buckle-Up Because Safety is Not Only for the Workplace." Three weeks later the flyer was attached to the paychecks of all salary employees. After ten weeks of individual prompts, the same message was displayed plantwide on table tents in the workers' cafeteria, in bathrooms above hand dryers, and on doors located in strategic places throughout the plant. Damaged and missing flyers were replaced throughout this plantwide prompt condition. The total duration of the written prompt intervention period was 17 weeks.

Safety slogan and celebration. A celebration announcing the winner of a plantwide safety slogan contest was scheduled near the Christmas Holidays. This celebration consisted of rewarding the winner with a $50 gift certificate to a store of his or her choice. At this event, Vince and Larry (the famous "Crash Test Dummies") made an appearance to distribute posters featuring two prominent Virginia Tech football players encouraging safety-belt use. To increase involvement, the celebration occurred after the first workshift and before the second workshift, and included refreshments and photograph sessions with the dummies. The winning slogan ("Bearings in Mind, Safety First!") was printed on a 3′ by 8′ banner and displayed for eight weeks above the main exit from the plant floor. This intervention lasted nine weeks.

Assigned goal. After the Slogan and Celebration intervention and a six-week withdrawal period, a specific, difficult but attainable goal was set for plantwide safety-belt use. Flyers displaying the plant logo, winning safety slogan, and the goal of 80% safety-belt use were posted on table tents in the cafeteria, in bathrooms above hand dryers, and on doors located in strategic places throughout the plant. These flyers were inspected weekly by research assistants and the plant safety manager for damage and loss. Damaged and missing flyers were replaced. The goal was set approximately 25% above the current percentage of belt use. This assigned goal intervention lasted 16 weeks.

Goal plus feedback. Feedback was included on flyers displayed weekly along with a reminder of the plant's belt-use goal. Flyers were posted in the same locations and fashion as in the Assigned Goal intervention described above with one noteworthy exception–feedback on the plantwide safety-belt use from the previous week was included on each flyer. This feedback was updated weekly, and new flyers were posted during the first shift each Monday as during the Assigned Goal phase. The flyers appeared in bright colors which were changed weekly to attract attention. Feedback on plantwide belt use from the previous week was provided for 16 weeks.

Promise card. Written buckle-up promise cards (as described in Geller & Lehman, 1991) were distributed with all employees' paychecks. The promise cards contained the company logo, the winning safety slogan, and a formal statement pledging the use of vehicle safety belts throughout a two-week period. The promise also included a location for the employees to sign, and a box they could check if they would allow their card to be posted in the plant. After the second week of the pledge period, the promise cards with this box checked (n = 200, 82% of the signed promises) were laminated on a 4 foot by 4 foot poster-board and displayed on the plant safety bulletin board.

Blank pledge-cards were distributed next to the posted promise cards and labeled "Second-Chance Pledges." The initial pledge period was extended an additional two weeks. New promises (n = 31) were posted (with approval) at the time they were signed. The flyers displaying the safety-belt use goal and behavioral feedback were posted as described above throughout this four-week pledge period.

Promise plus incentive/reward. This intervention was identical to the promise-card commitment described above, except combined with the promise was an incentive to sign the promise and buckle-up during the four-week pledge period. Specifically, flyers attached to all employees' paychecks, table tents in the workers' cafeteria, and signs posted in bathrooms above hand dryers and on doors located in strategic places throughout the plant announced that a cash prize would be awarded to one winner of a random drawing of a signed promise card. The amount of the cash prize was determined by the increase in mean safety-belt use among all plant employees. Specifically, $20 was added to the lottery prize for every percentage point increase in safety-belt use above the 59% pre-promise (assigned goal plus feedback) phase. The prize was awarded one week following the pledge period in a public drawing conducted by the first author and the plant safety manager. The winning card was drawn by a member of the plant safety team. A total of 88 more employees signed promise cards during this four-week intervention.

Return to baseline. A withdrawal period marked by removal of all intervention materials occurred after the plant Safety-Slogan Contest, the Promise Card, and Promise Card plus Incentive/Reward interventions. Each return to baseline lasted approximately six weeks.

RESULTS

Safety-Belt Use

During the initial four week baseline N = 1235 observations of drivers entering and leaving the plant were recorded and 221 of these drivers were observed wearing a seatbelt. These observations yielded an estimated 52% seatbelt use rate plantwide among its hourly and salaried employees. This plantwide baseline rate represents a dramatically higher use rate compared to the 3.4% and 17.4% use rates Geller et al. (1983) reported respectively among hourly and salaried workers at the same facility fifteen years earlier.

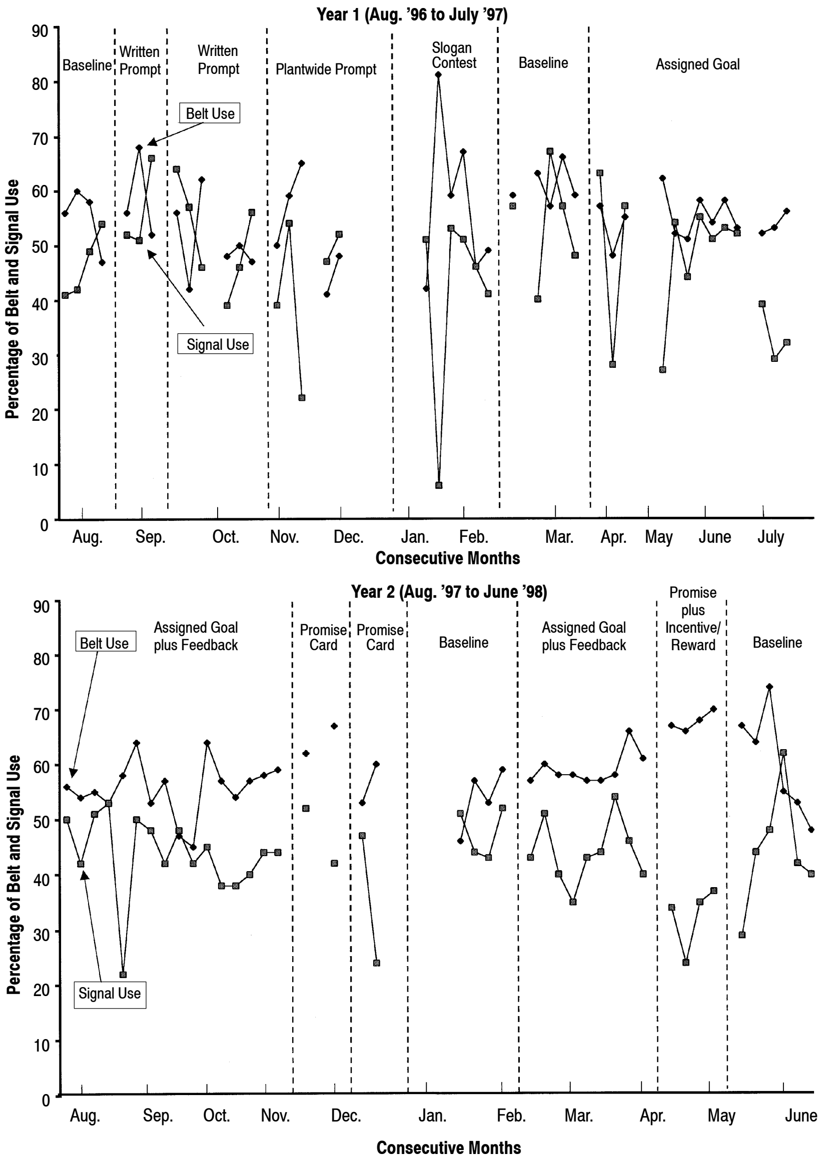
Figure 2 displays the weekly percentage of safety-belt use and turn-signal use for all employees throughout the 24 months of the current field study. Vertical lines indicate the introduction of a new intervention or return to baseline as described above. The month of data collection is provided above selected intervention phases, and the corresponding year is noted in each figure panel. The number of observations per phase and corresponding proportion of safety-belt and turn-signal use is provided in the Appendix.

A visual inspection of the data indicates that the data are highly variable. As a result of the variability, Pearson's r was calculated between the number of observations and the proportion of belt users defining each data point. This analysis revealed no significant relationship between the number of observations and percentage of belt users ($r = -.09$, n.s.).

Visual inspection also indicates no substantial increases in safety-belt use per intervention phase, even as the interventions became more intrusive. A noteworthy exception was the modest increase in plantwide belt use to 68% (n = 1007) as a result of the Promise plus Incentive/Reward intervention during Year 3. As shown in Figure 2, this effect continued for up to three weeks following the termination of the pledge period. Interestingly, only 213 (38% of the workforce) promise cards were signed during the Promise plus Incentive/Reward period. Of these, only 88 were signed by employees who had not signed a promise card during the prior Promise-Only intervention.

Overall, the gain in safety-belt use over the course of 24 months was approximately 15 percentage points or approximately 30 percent above the initial baseline level of 52% (n = 1235 observations) to 67% (n = 1193) through the first three weeks of the final return to baseline.

FIGURE 2. Plantwide safety-belt and turn-signal use across all phases of the current research. Horizontal lines indicate the occurence of a new intervention procedure.



This six-week mean was 65% (n = 1407), 25 percent above the baseline 24 months earlier.

Turn-Signal Use

Although not targeted, turn-signal use decreased steadily throughout the course of the research. More precisely, visual inspection of the data indicates that turn-signal use did not deviate markedly in any phase from the baseline mean of 50% (n = 1272), but did trend downward to a low of 34% (n = 1047) during the Incentive/Reward intervention. Although the data are highly variable, correlations between the number of observations and the proportion of turn-signal users indicated no significant relationship ($r = .08$, n.s.).

A Pearson's product moment correlation of turn-signal use with safety-belt use, however, resulted in a significant negative correlation ($r = -.28$, $p < .05$) for observations up to Week 75. The correlation from Week 75 through the last return to baseline was stronger ($r = -.38$, $p < .05$) and is reflected in Figure 2 by an 8 percentage point decrease in turn-signal use and a 10 percentage point increase in safety-belt use from Week 80 through the first half of the final baseline.

DISCUSSION

Overall, these data support the MIL hierarchy (Geller, 1998a; Geller et al., 1990). That is, one could argue that the initial antecedent strategies used to motivate safety-belt use in the current research are all first level interventions (tracks), less powerful than Virginia's BUL. The BUL is a third level intervention (a ply) because it threatens a consequence. As such, it follows that drivers not influenced by the BUL would not be influenced by repeated applications of less intrusive interventions. Fifteen years ago a similar behavioral intervention at this same facility increased safety-belt use from 17.4% to 50.6% among salary workers, and from 3.4% to 5.5% for hourly workers. As there was no safety-belt use law in 1982, the incentive was enough to provide the motivation to produce some desired behavior change. The baseline level of 52% belt use in the current study was only slightly higher than the intervention levels obtained in 1982. This suggests that those workers not motivated to avoid the improbable fine of $25 were not likely to buckle up for the remote probability of winning the raffle drawing. Apparently, these individuals need more intrusive and intensive interventions to motivate them to change. This is as predicted by the MIL hierarchy initially proposed by Geller et al. (1990) and refined by Geller (1998a).

Further support for the MIL came from the increase in safety-belt use affected by the more intrusive incentive/reward intervention (a stronger ply) during Year 2. Although reward opportunity was contingent on signing a written promise to buckle-up, the amount of the reward was contingent on the level of performance improvement by plant employees, indicating that an intervention requiring at least minimal individual involvement was most effective at increasing the use of safety belts. Conceptually, the incentive program specified a higher probability and more immediate consequence contingency as compared to the improbable fine threatened by the BUL. Thus, the incentive program was successful at getting some more drivers to buckle-up.

The role of the MIL hierarchy in predicting the behavioral impact of specific intervention strategies may be explained by the "Flow of Behavior Change" model proposed recently by Geller (1999). Specifically, the impact of a particular intervention depends on the readiness stage (behavioral history) of the target individual (Prochaska, DiClemente, & Norcross, 1992); the type of behavior targeted: other-directed, self-directed, or automatic; and the type of intervention used to increase behavior: instructional, motivational, supportive, or self-management.

All behavior starts at the other-directed stage. It is improved by an instructional or motivational intervention and therefore most sensitive to information and response-consequence contingencies. Instructional interventions are essentially antecedent conditions that provide information and therefore may be considered "tracks" (Skinner, 1957; Zettle & Hayes, 1982) that set the occasion for desired behavior change. These intervention procedures include education, training, and directive feedback. If target individuals are not influenced by instruction and continue to perform the undesirable behavior, additional instructional intervention will probably not work. In safety we call this behavior a calculated risk (Geller, 1998b), which usually requires a motivational intervention for correction. Common large-scale motivational strategies are typified by incentive/reward and disincentive/penalty contingencies which announce a certain consequence following the occurrence or nonoccurrence of a specified behavior. These interventions are "strong plys" (Skinner, 1957; Zettle & Hayes, 1982).

The antecedent strategies used in the current study (i.e., written prompts and assigned goals) clearly represent instructional interventions easy to implement on a large scale. According to the MIL hierarchy, repeated attempts at instruction should not have much impact on those individuals not initially influenced. Furthermore, because it implies a consequence, the Virginia BUL is a more intrusive motivational intervention and those uninfluenced by this disincentive/penalty program will likely not buckle-up for an instructional intervention. These individuals need a more intrusive motivational intervention. However, feedback and social approval are examples of Level 2 interventions and thus are still less intrusive than disincentives (the BUL) and incentive/rewards.

People who are not yet emitting a desired behavior fluently and make adjustments in their behavior as a result of an instructional intervention might need a supportive intervention to become more fluent. Thus, supportive interventions help to develop habits. Supportive interventions include rewarding feedback or social recognition for desired behaviors, and thus provide reinforcing consequences to increase response rate and thus fluency.

In the current study, the information provided by the percent safe feedback presumably *supported* the behavior of those already using their safety belts, although perhaps not on every trip. However, this intervention was not powerful enough to *motivate* non-users to start buckling up. Specifically, feedback added to the instructional assigned-goal intervention did not increase plantwide safety-belt use. Furthermore, the motivational incentive/reward intervention had only minimal impact, theoretically because for most people the contingency was presumably at the same intervention level as the Virginia BUL.

The relationships observed between safety-belt and turn-signal use are intriguing and support prior research and theory. From a plantwide perspective, the negative correlation between the use of safety belts and turn signals, exemplified by the overall increase in safety-belt use (25% over initial baseline) coupled with the overall decrease in turn-signal use (22% below initial baseline) supports danger compensation theory (Peltzman, 1975). Specifically, this theory proposes that when people encounter conditions they would rate or describe as less dangerous (or more safe), their rate of risky behavior is higher compared to their rate of risky behavior in the presence of conditions they would rate as more dangerous. The strongest evidence for danger compensation occurred during the last four phases of the research. The systematic inverse relationship between the use of safety belts and turn signals across these phases of research is the defining characteristic of the danger compensation effect (a.k.a. risk homeostasis, Wilde, 1982). This is a similar finding to that of Ludwig and Geller (1997) who found danger compensation in the form of a decrease in turn-signal use when employees were given a top-down goal-setting intervention to increase their complete vehicle stops at intersections.

CONCLUSION

The failure of the various behavioral interventions to increase vehicle safety-belt use at a large industrial site can be explained by considering the behavioral histories of those workers not currently buckling up. The employees at this facility have been informed many times about the value of safety belts, and they know how to buckle up. In fact, given that a safety-belt use law has been in effect in Virginia since 1989, vehicle occupants are exposed to two risks when they don't buckle up. They risk both a $25 fine and the likelihood of being more seriously injured in a vehicle crash. These risks *exist* as environmental contingencies whether people respond to them by buckling up or not. In the absence of learning histories that make it likely individuals will comply with laws such as the Virginia BUL they are likely to disobey these laws because the contingencies represent what Malott (1992) has called ineffective indirect acting contingencies.

To increase safety-belt use among those who know what to do but don't, a behavioral intervention needs to be motivational. And the motivational contingencies need to provide response-contingent consequences more powerful (relatively immediate, virtually certain, highly significant or salient, and of sufficiently great magnitude (Malott, 1992)) than any other intervention currently in place if they are to increase the safe behavior by a practically significant amount. Thus, it can be argued that our various instructional interventions (i.e., antecedent prompts) were irrelevant for most employees, and for most non-users of safety belts, the consequences of our motivational intervention were not significant enough given the powerful contextual background contingencies operationalized by the Virginia BUL and the systems used to enforce it. That is, they were not more powerful than the disincentive and relatively pervasive penalty based aversive contingencies already motivating safety-belt use. Future research should investigate the short-and long-term impact of more powerful motivational contingencies to increase safety-belt use, while also studying their indirect effects on other safety-related driving behaviors, such as turn-signal use.

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APPENDIX

Data for Figure 2

Date	Week	N =	# Buckled	Percentage	Week	N =	# Signaled	Percentage
7/30/96	1	200	112	56	1	203	83	41
8/4/96	2	111	67	60	2	120	50	42
8/11/96	3	241	140	58	3	251	103	49
8/18/96	4	683	321	47	4	698	377	54
8/25/96	5	905	507	56	5	940	489	52
9/1/96	6	174	118	68	6	196	100	51
9/8/96	7	322	167	52	7	330	218	66
9/15/96	8	39	22	56	8	39	25	64
9/22/96	9	99	42	42	9	99	56	57
9/29/96	10	92	57	62	10	98	45	46
10/6/96	11	*	*	*	11	*	*	*
10/13/96	12	67	32	48	12	66	26	39
10/20/96	13	152	76	50	13	149	69	46
10/27/96	14	79	37	47	14	84	47	56
11/3/96	15	104	52	50	15	120	47	39
11/10/96	16	54	32	59	16	54	29	54
11/17/96	17	17	11	65	17	18	4	22
11/24/96	18	*	*	*	18	*	*	*
12/1/96	19	234	96	41	19	242	114	47
12/8/96	20	226	108	48	20	237	123	52
12/15/96	21	*	*	*	21	*	*	*
12/22/96	22	*	*	*	22	*	*	*
12/29/96	23	*	*	*	23	*	*	*
1/5/97	24	*	*	*	24	*	*	*
1/12/97	25	93	39	42	25	94	48	51
1/19/97	26	16	13	81	26	18	2	6
1/26/97	27	173	102	59	27	187	99	53
2/2/97	28	55	37	67	28	67	34	51
2/9/97	29	136	63	46	29	136	63	46
2/16/97	30	128	63	49	30	134	55	41
2/23/97	31	150	89	59	31	166	95	57
3/2/97	32	*	*	*	32	*	*	*
3/9/97	33	262	165	63	33	274	110	40
3/16/97	34	57	32	57	34	61	41	67
3/23/97	35	109	72	66	35	122	70	57
3/30/97	36	423	250	59	36	421	202	48
4/6/97	37	163	93	57	37	171	108	63
4/13/97	38	69	33	48	38	68	19	28
4/20/97	39	44	24	55	39	49	28	57
4/27/97	40	*	*	*	40	*	*	*
5/4/97	41	*	*	*	41	*	*	*
5/11/97	42	73	45	62	42	74	20	27
5/18/97	43	346	180	52	43	349	188	54
5/25/97	44	762	389	51	44	785	345	44
6/2/97	45	735	426	58	45	746	410	55
6/9/97	46	991	535	54	46	1031	526	51
6/16/97	47	911	528	58	47	940	498	53
6/23/97	48	1105	586	53	48	1133	589	52
6/30/97	49	*	*	*	49	*	*	*
7/7/97	50	630	328	52	50	626	244	39

APPENDIX (continued)

Data for Figure 2

Date	Week	N =	# Buckled	Percentage	Week	N =	# Signaled	Percentage
7/14/97	51	425	225	53	51	421	122	29
7/21/97	52	342	192	56	52	381	122	32
7/28/97	53	812	455	56	53	774	387	50
8/4/97	54	1310	707	54	54	1325	557	42
8/11/97	55	576	317	55	55	562	287	51
8/18/97	56	541	287	53	56	513	272	53
8/25/97	57	173	100	58	57	166	37	22
9/1/97	58	310	198	64	58	296	148	50
9/8/97	59	533	282	53	59	606	291	48
9/15/97	60	365	208	57	60	419	176	42
9/22/97	61	816	384	47	61	891	428	48
9/29/97	62	847	381	45	62	874	367	42
10/6/97	63	576	369	64	63	626	282	45
10/13/97	64	830	473	57	64	803	305	38
10/20/97	65	768	415	54	65	827	314	38
10/27/97	66	667	380	57	66	708	283	40
11/3/97	67	659	382	58	67	749	330	44
11/10/97	68	515	304	59	68	599	264	44
11/17/97	69	646	401	62	69	680	354	52
11/24/97	70	*	*	*	70	*	*	*
12/1/97	71	387	259	67	71	411	173	42
12/8/97	72	310	164	53	72	345	162	47
12/15/97	73	322	193	60	73	340	82	24
12/22/97	74	*	*	*	74	*	*	*
12/29/97	75	*	*	*	75	*	*	*
1/5/98	76	*	*	*	76	*	*	*
1/12/98	77	136	63	46	77	138	70	51
1/19/98	78	343	196	57	78	363	160	44
1/26/98	79	185	98	53	79	203	87	43
2/2/98	80	452	267	59	80	487	253	52
2/9/98	81	293	167	57	81	320	138	43
2/16/98	82	504	302	60	82	518	264	51
2/23/98	83	430	249	58	83	463	185	40
3/2/98	84	299	173	58	84	306	107	35
3/9/98	85	356	203	57	85	406	175	43
3/16/98	86	382	218	57	86	399	176	44
3/23/98	87	556	322	58	87	973	525	54
3/30/98	88	444	293	66	88	444	204	46
4/6/98	89	411	251	61	89	429	172	40
4/13/98	90	264	177	67	90	280	95	34
4/20/98	91	170	112	66	91	178	43	24
4/27/98	92	238	162	68	92	248	87	35
5/4/98	93	335	235	70	93	341	126	37
5/11/98	94	511	342	67	94	563	163	29
5/18/98	95	469	300	64	95	483	213	44
5/25/98	96	213	158	74	96	205	98	48
6/1/98	97	44	24	55	97	47	29	62
6/8/98	98	114	60	53	98	111	47	42
6/15/98	99	56	27	48	99	52	21	40

*Indicates weeks during which no data were collected