

# AN EXAMINATION OF THE EFFECTS OF DELAYED VERSUS IMMEDIATE PROMPTS ON SAFETY BELT USE

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**ABSTRACT:** A three-group design was used to evaluate the effects of immediate and delayed verbal prompts on seat belt use versus a no-prompt control condition. Participants in this study were drivers who used valet parking services at a hotel. In the immediate-prompt condition, participants were prompted to buckle up immediately before entering a vehicle; in the delayed-prompt condition, the prompt was delivered when participants delivered the ticket to have their vehicles retrieved. The average delay between a prompt and when participants' vehicles were in motion was nearly 30 s in the immediate-prompt condition, whereas the delay in the delayed-prompt condition was nearly 5 min 30 s. It was hypothesized that (a) delayed prompts would result in increased seat belt usage rates as compared to the control condition and (b) immediate prompts would lead to higher seat belt usage than delayed prompts. Results supported the second hypothesis but not the first.

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**In 1998**, the leading cause of death in the United States for persons ages 4 through 33 years was trauma resulting from motor vehicle crashes (National Highway Traffic Safety Administration [NHTSA], 2001c). More than 41,000 people died, and approximately 3.2 million were injured in motor vehicle traffic crashes in 2000. This amounts to a traffic fatality occurring on average every 13 minutes in the United States. During the past 2 decades, traffic-related fatalities have decreased significantly. From 1981 through 1990, more than 45,300 traffic-related fatalities were recorded on average per year compared to an average of almost 41,300 from 1991 to 2000 (NHTSA, 2001b). Decreases in traffic accidents and fatalities can no doubt be attributed to improved designs and safety features of automobiles, and decreases have also been found to correlate with lowered speed limits (e.g., Engel & Thomsen, 1992; Helfenstein, 1990) and increases in the use of seat belts (Loeb, 1993). From the time when seat belts were first installed in automobiles in the 1950s and until the early 1980s, seat belt use was only about 10% to 15% nationwide (NHTSA, 2001c). Legislation at the state level requiring the use of seat belts by adults began in the 1980s, and more states followed suit during the next two decades. In the year 2000, only the state of New Hampshire did not have any laws on adult seat belt use, whereas 17 states enforced standard seat belt laws and the remaining states enforced secondary seat belt laws. Under secondary seat belt laws, an officer must first stop a driver for some other type of violation before a citation for not wearing a seat belt can be issued. A standard law gives police officers the power to stop motorists and issue a seat belt citation solely on the basis of a failure to buckle up.

Government agencies, private organizations, and car manufacturers have also advocated for the use of seat belts through various campaigns and initiatives. For example, the National Incentive to Increase Seat Belt Use, established in 1997 under the direction of President Clinton, set goals to increase seat belt use to 90% and reduce child occupant fatalities by 25% before the year 2005 through legislation, high-visibility law enforcement, public education, and by building public-private partnerships aimed at increasing seat belt use (NHTSA, 1997).

Seat belt use rates in the United States have steadily increased since the 1980s (NHTSA, 2001a). National seat belt use was only 14% in 1984 compared to 42% in 1987 and 62% in 1992, and usage reached an all-time high of 73% in June 2001. But there is still room for improvement in seat belt use among Americans. Although it is estimated that safety belts have saved more than 135,000 lives from the year 1975 through 2000 (NHTSA, 2001c), 60%

of vehicle occupants killed in 2000 were not wearing seat belts, and it is estimated that more than 5,000 additional lives could have been saved in 1999 had the use rate been 85% (NHTSA, 2001a).

Various methods have been used to increase seat belt use. For example, public education and information programs, media campaigns, and strict enforcement of seat belt laws are probably the most common strategies. Behavior analysis techniques have also been utilized to increase seat belt use, such as feedback on seat belt use (e.g., Pasto & Baker, 2001), signings of pledge cards, rewards for seat belt use, and prompts to buckle up (Geller, Patterson, & Talbott, 1982).

Kaye, Sapolsky, and Montgomery (1995) evaluated the effectiveness of the Thumbs Up public information and education program (consisting of posters, billboards, bumper stickers, and newspaper, television, and radio coverage) on seat belt use. The project did not result in an overall increase in safety belt use, and at the 3-month follow-up after the discontinuation of the program, seat belt use was still at preintervention levels. Scheltema, Brost, Skager, and Roberts (2002) implemented an intensive safety campaign aimed at increasing seat belt use among trauma center employees. Seat belt use rose from 74% to 81.5% but reached preintervention levels fairly quickly after the campaign ended. D. Roberts and Geller (1994) investigated the effects of a program that consisted of repeated public information campaigns and stricter enforcements of seat belt laws by police officers. Seat belt use increased from 52% to 73% as a result of the intervention, whereas seat belt use remained close to 50% at control sites.

Publicly displayed feedback has proven to be effective in increasing seat belt use. Pasto and Baker (2001) provided daily feedback on safety belt use at a junior college parking lot in combination with informational flyers. Seat belt use increased considerably during the intervention, and although a negative trend appeared at follow-up, some maintenance effects were observed. Malenfant, Wells, Van Houten, and Williams (1996) posted feedback weekly at prominent locations at two sites. Seat belt use increased somewhat in both locations, but no data were collected to evaluate possible maintenance effects.

As the chances of actually being involved in a motor vehicle crash each time a person enters a car are very low, motor vehicle occupants rarely, if ever, experience the positive consequences of wearing seat belts or the negative consequences of failing to buckle up (Williams, Thyer, Bailey, & Harrison, 1989), although buckling up may occur through some kind of analog to negative reinforcement (Malott & Suarez, 2003) to avoid the negative consequence of getting a ticket. Therefore, some researchers have evaluated the

effects of providing contingent tangible reinforcers (i.e., programmed consequences) for seat belt use.

Cope, Moy, and Grossnickle (1988) provided soft drinks contingent on customer seat belt use. Seat belt use increased while the program was in effect but declined at follow-up. Mortimer, Goldsteen, Armstrong, and Macrina (1990) evaluated the effectiveness of providing incentives as compared with increased enforcement of seat belt laws and a combined intervention of both incentives and enforcement. The biggest increase was observed where the combined intervention was implemented, and maintenance effects were observed at a 3-month follow-up in sites where incentives had been provided. M. Roberts, Fanurik, and Wilson (1988) provided various tangible rewards to elementary school children contingent on seat belt use, which resulted in a substantial increase that was maintained to some extent at follow-up.

Most interventions aimed at increasing the use of seat belts either do not report data on the maintenance of effects after program discontinuation or report a return to preintervention usage rates at follow-up. Incentive and feedback strategies have sometimes been demonstrated to maintain increased seat belt use, but such methods usually require considerable resources. If one-shot interventions repeatedly fail to demonstrate lasting effects on seat belt use, a focus on inexpensive methods that can be implemented continuously certainly seems warranted. Having motorists sign pledge cards is a method that has proven to be consistently effective (Geller & Lehman, 1991) and seems to have lasting effects on behavior. Prompts, both written and verbal, have also proven to be consistently effective in increasing safety belt use (Geller, Johnson, & Pelton, 1982; Williams et al., 1989).

Berry, Geller, Calef, and Calef (1992) compared the effectiveness of displaying a written prompt to buckle up at a parking lot with a person actually holding the prompting sign. The results of the Berry et al. study suggested that the socially assisted prompt with a person present was more effective in producing a behavior change than just posting the sign. Williams et al. (1989) also found socially assisted written prompts to be more effective than written prompts alone.

This study expanded on prior studies on the effectiveness of prompting procedures on seat belt use. Verbal prompts that are, by nature, socially assisted, can be delivered repeatedly and at no cost by people who come into contact with departing motorists—for example, supermarket grocery carriers. Engerman, Austin, and Bailey (1997) instructed supermarket grocery carriers to deliver prompts to shoppers just before the shoppers departed in

motor vehicles, which resulted in a 12% increase in seat belt use from baseline. Austin, Alvero, and Olson (1998) used a procedure that involved a greater delay than in the Engerman et al. study between the delivery of the prompt and the opportunity to buckle up, but they still found a sizable increase in drivers' seat belt use. Daniels (1989) suggested that prompts, like any other antecedent, are most likely to be effective if they immediately precede the opportunity to engage in the desired behavior. Although substantial research has been conducted on the delayed-prompt procedure with developmentally disabled populations (see Handen & Zane, 1987, for a review), little research has been conducted on the effects of a delay between prompts and the opportunity to emit behavior with normally developing participants. Furthermore, a literature search revealed no studies that directly manipulated the delay between prompt delivery and fastening seat belts.

Research with nonhuman animals has demonstrated that the delay between responses and environmental stimuli has to be on the order of seconds if the environmental stimuli (e.g., reinforcers) are to have an effect on behavior (Malott & Suarez, 2003). Verbal humans, however, are relatively insensitive to even more significant delays between responses and environmental events, and it has been hypothesized that verbal rules control behavior that has no obvious immediate environmental consequences (e.g., Michael, 1993). In the same manner, the passage of time between a prompt and the opportunity to emit a response offers the possibility of other behaviors or stimuli to intervene, which weakens the relationship between the prompt and the response (Handen & Zane, 1987). However, it is also possible that the prompt functions to occasion the statement of a rule, such as, "If I buckle up, I may avoid injury." A rule may therefore exert control over the response of buckling up in spite of some delay.

In the present study, the effects of a delay on verbal prompt effectiveness were investigated. Prompts to fasten seat belts were delivered to motor vehicle occupants either by (a) valet parking attendants immediately before motorists entered their vehicles or (b) key attendants, which involved a delay between prompt delivery and the opportunity to buckle up. The delay between prompt delivery and the opportunity to buckle up was measured to investigate the effects of the prompt delay on rates of seat belt use. It was hypothesized that the delayed prompts would result in increased seat belt usage rates as compared to the control condition and that immediate prompts would lead to higher seat belt usage than delayed prompts.

## METHOD

### PARTICIPANTS AND SETTING

Participants in this study were patrons of a large hotel and casino in the Western United States who utilized the hotel's valet parking service. A secondary seat belt law was in effect in the state in which this study was carried out.

### RESPONSE MEASUREMENT

Data were collected on seat belt use of drivers. For participants' behavior to be scored as safe, the seat belt had to be fastened before the vehicle was in motion. Data were collected on the sex of drivers (62% male, 38% female), but it was not possible to collect accurate data on the age of participants.

Interobserver agreement sessions were evenly distributed across experimental conditions. Interobserver agreement scores were calculated using the following formula:

$$\frac{\text{Number of Agreements}}{\text{Number of Agreements and Disagreements}} \times 100$$

Data were also collected on the amount of time that elapsed between the delivery of a prompt and when the vehicle of the person who received the prompt was in motion.

### OBSERVATIONS

Data were collected by trained undergraduate and graduate student observers. Observers were located in the waiting area of the valet parking service and had a clear view of participants and their safety belt use. Data were collected for 22 observation sessions on the seat belt use of 433 participants. During seven sessions, no prompts were delivered, whereas the number of immediate-prompt and delayed-prompt sessions was seven and eight, respectively. All valet parking services patrons utilizing the valet service during either of the two prompt sessions were given a prompt. An average of 19.72 participants were observed during each observation session.

#### DESIGN AND PROCEDURE

A multiple treatment design was utilized in this study. The order of the three experimental conditions was randomly alternated: immediate-prompt delivery, delayed-prompt delivery, and a no-prompt (i.e., control) condition. The prompt, "Be safe, remember to fasten your seatbelt!" was delivered verbally by valet parking staff to participants. The same prompt was used during both prompting conditions. During the immediate-prompt delivery condition, participants received the prompt from valet parking chauffeurs when they entered their vehicles to leave the premises. In the delayed-prompt condition, key attendants located inside the hotel lobby delivered the prompts to participants as they handed in claim tickets for their cars. Recipients of prompts were both drivers and passengers.

#### RESULTS

Interobserver agreement checks were conducted during 32% of the observation sessions. Interobserver agreement for driver seat belt use was 96%.

A total of 284 prompts were delivered to drivers and 6 to passengers only during the course of seven immediate-prompt sessions and eight delayed-prompt sessions. A measure of the delay between delivery of a prompt and when a vehicle was in motion was calculated for 274 prompt deliveries. In the immediate-prompt delivery condition, the average delay between delivery of a prompt and when a vehicle was in motion was 30.09 s ( $SD = 34.56$  s), whereas the corresponding time for the delayed-prompt delivery condition was 5 min 21 s ( $SD = 2$  min 38 s). During the no-prompt control condition, 145 drivers were observed for seat belt use during seven observation sessions.

During the no-prompt control condition, 55.17% of participants were buckled up. During the delayed-prompt condition, 57.53% of participants had their seat belts fastened, whereas 79.64% of participants were buckled up during the immediate-prompt condition. A difference was detected between the control condition and the immediate prompt condition,  $\chi^2 = (1, N = 284) = 18.41, p < .001$ , and the delayed-prompt and immediate-prompt conditions,  $\chi^2 = (1, N = 285) = 15.29, p < .001$ . No difference was detected between the control condition and the delayed-prompt condition,  $\chi^2 = (1, N = 291) = 0.17, p > .001$ .

## DISCUSSION

As was hypothesized, immediate prompts led to higher seat belt use than delayed prompts. However, the hypothesis that delayed prompts would lead to increased seat belt use as compared to the no-prompt control condition was not supported. It does not appear likely that delayed prompts functioned to prompt the behavior of buckling up or safety-related rule statements. It is likely that the delayed prompts were ineffective because other stimuli or responses occurred in the interim and abolished the relationship between the prompt and buckling up. In the six instances in which passengers were given the prompt, which all occurred during the immediate-prompt sessions, only one driver did not buckle up. It is possible that passengers prompted drivers to buckle up in those instances, or the act of passengers' fastening their seat belts prompted drivers to do the same.

This study is the first to manipulate a delay between the prompt and the opportunity to fasten a seat belt and suggests that the delay between the delivery of the prompt and the opportunity to buckle up should be as short as possible, as there was no discernible difference in seat belt use between the delayed-prompt condition and the no-prompt control condition. This finding is consistent with Daniels's (1989) recommendation that prompts should be delivered as temporally close as possible to the opportunity to engage in the desired behaviors. For example, in Engerman et al. (1997), prompts were delivered immediately before participants entered their vehicles, and increases were noted in seat belt use among supermarket patrons. Although Austin et al. (1998) used a procedure that involved a somewhat greater delay than in the Engerman et al. study between the delivery of the prompt and the opportunity to buckle up, a clear increase in drivers' seat belt use was observed. Although the time interval between the prompt and the response opportunity was not formally reported in the Austin et al. study, the time interval was measured on occasion and found to be between 1 and 2 min. On average, this represents a shorter delay than that observed during the delayed-prompt condition of the current study.

One of the possible weaknesses of this study is that patrons of hotels and casinos may very likely be from households with relatively high incomes. Drivers from higher income households report higher seat belt usage than drivers from lower income households (NHTSA, 2000), which might suggest a bias in the current study. Further research might focus on whether the effects observed in the present study generalize to participants with different demographic backgrounds.

Maintenance effects were not evaluated in this study. A possible continuation of this line of research would be to institute a similar prompting

procedure in an environment in which participants could be repeatedly exposed to verbal prompts during an extended period of time and then evaluate maintenance after prompts are withdrawn. It might also be beneficial to investigate the effects of different schedules of exposure to prompts on a population repeatedly exposed to buckling prompts.

This study demonstrated that a simple, socially assisted prompting procedure could considerably increase seat belt use. Most interventions aimed at increasing seat belt use fail to demonstrate maintenance over time, often in spite of considerable monetary costs. This low-cost intervention can, in principle, be implemented continuously by anyone that comes into contact with motorists and passengers just prior to entering a vehicle, and it seems preferable to costly feedback and/or reward procedures.

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