Warning Compliance: Effects of a Video Warning Sign and Modeling on Behavior

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ABSTRACT

The effectiveness of warnings and social influence (modeling) for improving safety behavior was examined in a laboratory setting. Although training programs aimed at improving safety behavior in the workplace frequently use videotapes with models portraying safe and unsafe behaviors, the effectiveness of training interventions of this type are rarely evaluated nor have results been published in the research literature. Training to increase safety behaviors can translate into large savings to an organization in terms of reductions in equipment damage, cost of liability litigation, and decreases in injury to both consumers and employees. The present research examined the effects of a posted (video) warning, video role-modeling, and a voice warning on compliance with safety behaviors. Participants were randomly assigned to one of three conditions, warning alone, warning and exposure to a video model performing the appropriate safety behaviors, or warning, video modeling, and a voice warning. The results showed that behavioral modeling presented through a video display significantly enhanced behavioral compliance compared to a video sign warning alone. The addition of a voice warning did not further increase compliance due to ceiling effects produced by the powerful influence of the modeling. Implications of this research for safety training programs and forensic human factors as well as suggestions for future research are discussed.

INTRODUCTION

Providing safer conditions for consumers and employees is a central goal and a major challenge for accident prevention programs. One common method used in accident prevention programs is the use of warnings. The purpose of warnings is to prevent people from performing unsafe behaviors that may be performed if warnings are not provided. Previous warning research has identified a number of factors that influence the behavioral effectiveness of warnings including: warning placement (Wogalter, Godfrey, Fontenelle, Desaulniers, Rothstein, and Laughery, 1987) embedding the warning within other text (Strawbridge, 1986) social influence of others (Wogalter, Allison, and McKenna, 1989) severity of consequences (Wogalter and Barlow, 1990) inclusion of pictorials (Jaynes and Boles, 1990) voice (Wogalter and Young, 1991) and cost of compliance in terms of effort required to comply (Wogalter et al., 1989). In addition, research in personnel psychology suggests that training programs that instruct individuals on how to use safe behaviors and motivate them to engage in these behaviors are useful for enhancing compliance with safety behaviors (Komacki, Barwick, and Scott, 1978; Reber, Wallin, and Chhokar, 1984). Furthermore, the use of safe behaviors by both employees and consumers is of interest to most organizations because of the potential for costly lawsuits resulting from injuries caused by the improper use of safety equipment or misinterpretation of instructions.

While warnings stress the avoidance of unsafe behaviors, behavioral modeling techniques focus on providing guidelines for the use of safe behaviors (e.g., Wogalter et al., 1989). Observational learning, the acquisition and subsequent enactment of behaviors exhibited by others, is affected by several processes. First, the individual must attend to the behavior of the model. Second, the individual must retain the information presented by the model. Third, the person must have the ability to perform the observed action. Finally, motivation to perform the modeled behavior must be present. When these four conditions are met, there is an increased likelihood that the observer will imitate the behavior of the model (Baron, 1992).

The concept of observational learning has been examined in many contexts. Wogalter et al. (1989) conducted two studies to examine the effects of a confederate performing safety behaviors on behavioral compliance. Participants in this study performed a laboratory chemistry experiment while exposed to a live model who either used or failed to use safety equipment (i.e., donning mask and gloves). Results indicated that participants were more likely to use safety equipment when the confederate also used the protective equipment. In addition, results of a field study in which a confederate used either an elevator or the stairs when a warning concerning potential malfunction of an elevator was posted confirmed the effects of social influence on compliance with warnings. Specifically, participants were more likely to use the stairs when the confederate heeded the warning than when the confederate did not.

Although research on behavioral modeling has supported the effect of social influence on behavioral compliance with safety measures, both studies discussed above utilized live models, thus it is unknown whether the use of other media such as videos would enhance behavioral compliance. In the training context, videotapes are often used to teach individuals the importance of safety behavior and to provide examples of safe and unsafe behaviors. However, the effectiveness of such safety training programs is rarely evaluated, and to date, studies of effectiveness have not appeared in the research literature. Thus, a purpose of the present study was to examine the effects of behavior modeling using a videotape that simulates the type of behaviors often used in safety training interventions. Validation of video-training programs could aid forensic human factors specialists in providing advice to organizations and the court on effective accident prevention methods.

Providing information through the use of both warning

signs and modeling may strengthen behavioral compliance. That is, an additive effect may occur. In order to maximize the effects of modeling, Wexley and Latham (1991) suggested that behaviors must be presented in a clear and detailed manner. Also, before observing a model, individuals should be cued to attend to the specific, relevant behaviors being modeled. Posted warnings may serve as an initial cue which focuses attention on appropriate behavior. Once attention is focused, the individual may be more likely to attend to the behavior of the model. The purpose of the present study was to examine the effects of both a warning and behavioral modeling on compliance with safety instructions.

In addition to posted warnings, the effect of a voice warning on behavioral compliance was also examined. Recent research has shown that voice warnings have a powerful effect on compliance (Wogalter and Young, 1991; Wogalter et al., 1991) especially when they are redundant with information in print warnings. For example, Wogalter and Young (1991) found that combining a voice warning with a printed warning resulted in greater compliance with the use of safety equipment than either a voice or print warning alone. Thus, another purpose of this research was to examine the effects of redundant messages by combining a posted warning and a voice warning along with the presentation of a video model exhibiting the intended safe behaviors.

In summary, three conditions were utilized to examine behavioral compliance. In the first condition, individuals were exposed to a posted (video) sign only. In the second condition, individuals were first presented with the sign and then the videotaped model. The third condition included the sign, the videotaped model and a voice warning. Compliance with the use of safety equipment (mask and gloves) during a chemistry task was assessed for all three conditions.

METHOD

Participants

Thirty-six undergraduate students from Rensselaer Polytechnic Institute participated for credit towards their introductory course or were paid $5.00 for their participation. Individuals were randomly signed to one of three conditions.

Design

The experiment consisted of three between-subjects conditions: (1) videotape of a warning sign, (2) videotape of the warning sign followed by a video shot of the mask and gloves, and a male model donning them, and (3) videotape identical to the second condition plus presentation of a voice warning. The wearing of protective gear by participants was recorded.

Materials

The basic task that participants performed is similar to that employed in Wogalter et al. (1987, 1989). Participants used a triple-beam balance, beakers, flasks, and graduated cylinders to weigh, measure and mix several substances. The substances were disguised to appear potentially hazardous but were actually safe (e.g., (powdered sugar with green food coloring). A large supply of plastic gloves and face masks were also available on a laboratory table next to the equipment.

Two videotapes were constructed. In the no role-model video, only a full screen shot of the warning sign was presented for 30 seconds. The warning sign used was identical to one of the signs used in a study conducted by Wogalter, Rashid, Clarke, and Kalsher (1991) and contained the message: "CAUTION. Skin and Lung Irritant. Improper mixing may result in a compound that can burn skin and lungs. Wear rubber gloves and mask." The warning was in bold black print on a 31 x 31 cm bright yellow background. In the role-model videos, the warning sign was displayed for 10 seconds, followed by a full screen shot of several gloves and mask for 8 seconds, and then followed by a 12 second clip showing a 20-30 year old male approaching a table and putting on a mask and a pair of gloves. Two of the conditions lacked sound. In the third condition, the same role-model video was used except that during a 10 second shot of the sign, a male voice could be heard presenting the same warning message. Participants viewed the video before entering the laboratory room. There were no other warning messages except the videos. Participants watched the video on a 48 cm colored monitor at a distance of 2 m.

Procedure

Participants were asked to read and sign a consent form which described the study as investigating the procedures and equipment involved in a chemistry laboratory task and were then shown one of the three videotapes. They were asked to wear a white lab coat and then were shown how to use a triple-beam balance. The experimenter told the participant to perform the instructed tasks quickly and accurately, and then escorted them to the doorway, pointed to the laboratory table, and instructed the participant to enter the room and begin. The experimenter recorded whether the participant wore the protective gear.

Upon completion of the task, participants were asked to complete a questionnaire which asked whether or not they noticed the gloves, the masks, and whether they heard or saw a warning.

RESULTS

All subjects who wore one piece of safety equipment also wore the second piece (i.e., gloves and mask). In the video warning sign condition, 50% of the participants used the safety equipment provided. Ninety-two percent of the participants complied with the use of the safety equipment when provided with both the warning sign and the video role-model. When the voice warning was added to the warning sign and model condition, 100% compliance with safety procedures was obtained. The overall Chi-square test for the compliance data was significant, χ^2 (2, N = 36) = 10.99, $p < .01$. Subsequent Chi-square tests indicated that the two video role-model conditions produced nearly perfect compliance and both were higher than the video sign alone. Specific contrasts indicated that compliance was higher in the video sign/model condition as compared to the video sign alone condition, χ^2 (1, N = 36) = 5.04, $p < .05$. The contrast between the video sign alone condition and the video sign, model, and voice condition was also significant, χ^2 (1, N = 36) = 8.00, $p < .01$, indicating higher compliance in the latter condition. The contrast between the

two modeling conditions was not significant.

The questionnaire data indicated that participants who reported seeing the safety equipment (i.e., gloves, masks) or reported hearing or seeing a warning, were more likely to comply with the warning. The following variables were significantly correlated with compliance: seeing the gloves, seeing the masks, and seeing or hearing the warning, ϕs ($\underline{N}$ = 36) = .34, .34 and .49, respectively, ps < .05.

DISCUSSION

Almost all of the participants in the role-model conditions performed the precautionary actions illustrated in the video. This result confirms the substantial social influence effect previously reported (Wogalter et al., 1989) but also extends this work. The earlier study used live models who simultaneously performed the task along with the participants. In the current study, the effect was accomplished by a video presented before the task and outside the context of the laboratory room. The voice warning did not further enhance the effect of the role-model video. This null finding was most likely due to a ceiling effect as the role-model had already pushed performance near complete compliance. The high rate of compliance in the video model conditions indicates how powerful training videos can be in encouraging the use proper use of safety procedures.

Results of the questionnaire data suggest that when individuals notice safety equipment and warnings, they are more likely to engage in safe behaviors. The major implications of these findings are that safety equipment should be placed in close proximity to where potentially dangerous tasks are being performed and that warnings and equipment should be salient to individuals required to perform such tasks.

The effects of the current study together with the findings of Wogalter et al. (1989) lends support for the potential effectiveness of training videos used to encourage and teach the use of safe behaviors in the workplace. With the advent of relatively inexpensive hand-held camcorders and video equipment, it is possible to produce videos that not only show dangers one should look out for but also the appropriate ways to avoid them. The cost of producing and implementing safety videos would be substantially lower in terms of employee injury, staff reduction, and any subsequent liability litigation that might occur as a result of a preventable injury. The present research also provides useful information to forensic human factors specialists on more effective methods of communicating hazard information. The utility of a safety video is not limited to employee safety programs. Many households now contain a video player, and therefore, inexpensive videos might be enclosed with certain consumer products that could better communicate its operation and potential hazards than an instruction manual.

Although the present study lends support for the use of videotaped training films for use in accident reduction, further research is needed to examine the effects of such interventions over time. Additional research is currently being conducted in our laboratory aimed at examining the effects of a delay between the observation of the role-model film and performance of appropriate behaviors. In this situation, it is possible that redundant warnings which include a voice warning may enhance the long-term retention of safety information and thus behavioral compliance.

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