Using persuasive messages to encourage voluntary hearing protection among coal miners

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Abstract

Introduction: This longitudinal field study was designed to encourage Appalachian coal miners in West Virginia and Pennsylvania to engage in hearing-protection behaviors. *Method*: Participants were mailed postcards that featured either a positive, negative, or neutral message on the outside of the postcard and a message encouraging hearing protection behaviors on the inside. The first posttest measurement of the effectiveness of the persuasive messages was conducted about a week after the postcards were mailed. The delayed posttest measurement was conducted six weeks later. *Results*: Responses from 307 coal miners revealed that the positive or neutral messages generated significantly more self-reported hearing protection behaviors than the negative message. Identical results were obtained in a delayed posttest assessment of miners' self-reported hearing protection behaviors. The positive message was also more effective than either the neutral or negative message in preventing defensive mechanisms from emerging over time. *Impact on Industry*: Positive and neutral messages were convincingly more successful than negative messages in facilitating self-reported hearing protection behaviors among coal miners. Similarly, the positive messages kept defensive processes at bay.

Keywords: Hearing protection; Hearing loss; Coal miners; Campaign; Messages

1. Introduction

Hearing loss, one of the common occupational diseases in the United States, is often accepted as a normal consequence of employment. More than 30 million workers are regularly exposed to hazardous noise levels. Those afflicted with occupational hearing loss can experience: (a) the social isolation resulting from impaired communication with family, friends, and coworkers; (b) a diminished ability to monitor the work environment (warning signals, equipment sounds); (c) a higher risk of worksite accidents and injury; and (d) a reduced quality of life due to unrelenting tinnitus (ringing in the ears; National Institute for Occupational Safety and Health [NIOSH], 1996). The coal-mining sector has the highest levels of noise exposure in the entire mining industry. As a result, the Mine Safety and Health Administration initiated a Federal law in 2000 establishing noise standards for employers of mines. In conjunction with the new standards, the mining industry encourages a number of voluntary behaviors for coal mine employees, including wearing hearing protection and getting a hearing test. In a joint effort with NIOSH, we developed a series of persuasive messages to advocate these voluntary behaviors.

The issue of practical importance is also accompanied by one of theoretical import as "surprisingly few" studies of persuasive messages elicit both positive and negative affect (Dillard & Meijnders, 2002, p. 316). The primary research goal of this study, beyond the applied goal of increasing awareness about voluntary hearing protection, was to compare the effects of positive, negative, and neutral persuasive messages on both adaptive outcomes (attitudes, intentions, and self-reported behaviors) and

defensive mechanisms typically used to filter out threatening or harmful information (perceived manipulation and message distortion).

1.1. Motivating through affect

Two lines of research inform our study. The first research cluster examines the outcomes associated with some combination of rational or emotional persuasive appeals. Although there is no universal consensus about whether rational or emotional messages are more effective, the results are useful in guiding our expectations about the role of affect in persuasion. For example, Reeves, Newhagen, Maibach, Basil, and Kurz (1991) compared (among others) positive and negative television health ads from multiple health contexts, including AIDS, smoking, alcohol, and blood pressure, among others. They concluded that individuals were more likely to pay attention (measured by secondary reaction time) to positive ads, but that memory (assessed through recognition latency) was better for negative ads. Flora and Maibach (1990) compared emotional and rational messages about AIDS. They concluded that low-involved participants remembered emotional more than rational messages, but no memory differences were detected among high-involved participants. Finally, Zinn and Manfredo (2000) determined that rational and emotional appeals were equally persuasive for arguing against a trapping ban initiative in Colorado, although the emotional appeals were more likely to be recalled (using a thought-listing task). Some researchers have examined a variant of the emotional-rational issue by testing narratives against statistical messages (e.g., Baesler & Burgoon, 1994; Kopfman, Smith, Ah Yun, & Hodges, 1998). Results, however, are inconsistent and inconclusive. In sum, the scattered research in this area suggests that emotional appeals have a slight advantage of being more memorable, particularly if they are negative. But such a conclusion rests on fairly shaky ground and confounding variables exist, including equating "emotional responses to involvement, cognitive responses, or liking" (Reeves et al., 1991, p. 680).

A second line of research provides theoretical guidance on the use of negative (fear-based) messages and is, arguably, more conclusive than the diffuse results associated with the emotional-rational message literature. While fear appeal messages have an admittedly schizophrenic history (Stephenson & Witte, 2001), more recent advances by Witte (1992, 1994) appear to have yielded at least some consistency in outcomes. At its essence, Witte's Extended Parallel Process Model explains why fear-inducing messages do and do not work. Perhaps most importantly for message designers, Witte clarifies how two message components emphasizing threat and efficacy should be constructed to elicit adaptive outcomes. There is little question about the prevalence of fear-arousing messages in the health literature, including AIDS messages (Freimuth, Hammond, Edgar, & Monahan, 1990), breast cancer messages (Kline & Mattson, 1999), and parental anti-drug ads (Stephenson, 2002). Although they have not always been viewed favorably (see Backer, Rogers, & Sopory, 1992), fear appeals have a recent history of generating beneficial health outcomes. Fear, as a negative emotion (Witte, 1992), provide a basis for which to understand, explain, and predict outcomes of negative messages. Unfortunately, how the negative message would fare against a positive message on behavioral outcomes remains unknown.

1.2. The proposed study

Collectively, these research streams offer a rather disjointed picture for informing the comparative effectiveness of positive-, negative-, and neutral-based appeals. In general, we know that negative (fear-based) messages can elicit health behavior change. But beyond fear, other emotions are clearly less researched (Nabi, 2002). No evidence exists to suggest that message-induced positive emotion will facilitate changes in health behavior. Only Reeves et al. (1991) provide any indication of the effect of positive versus negative health ads, and their dependent variables were more proximal than actual behavior change. A study comparing the effect of emotion-based messages on behavior change is clearly warranted and poised to contribute new knowledge to campaign research.

Hence, the focus of this investigation, and our first research question, is the comparative effectiveness of positive-, negative-, and neutral-affect messages in increasing voluntary hearing protection behaviors among Appalachian coal miners. But a second research question involves determining whether the effects, if any, remained constant, increased, or deteriorated over time. Third, we sought to determine which of the three emotional appeals were most effective in offsetting defensive mechanisms typically associated with fear-based persuasive appeals. The fourth and final research question, similar to the second, was whether these defensive mechanisms remained static or changed in some way over time. The longitudinal panel design, method, and procedures employed to answer these four research questions are subsequently described.

2. Method

The effectiveness of three message types to increase self-reported hearing-protection behaviors was tested in a field experiment employing a one-way design with three experimental conditions plus a control group. The three experimental conditions featured positive-(POS), negative-(NEG), and neutral-affect (NEUT) messages. To offset the threats to the validity of this field study, we also employed a

fourth condition, a no-message experimental control group (CTRL).

2.1. Sampling procedure

Participants were miners from the Appalachian region of West Virginia and Pennsylvania. The United Mine Worker's Association provided a list of miners from 23 randomly-selected coal mines in West Virginia and Pennsylvania.[1] To ensure that an adequate number of miners were available from each mine, we established criteria *a priori* that individuals would only be randomly selected from mines that employed at least 100 miners.

Given that we had four conditions (three experimental groups plus control), we randomly assigned each of the 23 mines to one of these four conditions. Six mines were randomly assigned to the POS message condition, six to the NEG message condition, six to the NEUT message condition, and five to the CTRL condition.

Then, we randomly selected 50 miners from each of the 23 mines to receive the persuasive message postcards. This procedure yielded a subject pool of 300 randomly selected miners who received the POS message manipulation, 300 who received the NEG manipulation, 300 who received the NEUT manipulation, and 250 placed in the control group.

2.2. Procedures and message manipulations

Participants in the three experimental message conditions were mailed two different postcards containing recommendations for hearing protection while working. All postcards were pretested and validated (described later). A second postcard was mailed to miners one week after the first. A survey was mailed to miners one week after the second postcard. Affixed to the questionnaire were both postcards that they had previously received.[2] The CTRL condition received only the survey. All conditions received a cover letter in the survey packet from the United Mine Workers' Association, the labor union that represents the targeted miners, encouraging their assistance with the survey.

Miners were asked to complete and mail back the survey in exchange for a custom-printed mining decal. An experienced research firm collected the surveys and entered data. Additionally, the research firm ensured that at least 10 individuals from each mine responded to the survey. In addition to guaranteeing representation across all mines, this procedure guaranteed the sample size needed to ensure adequate power to detect significant differences if there are, in fact, differences between groups. Hence, if a survey was not mailed, the research firm contacted miners to complete the survey by phone until each mine was represented by 10 employees.

About six weeks after the postcards were mailed, miners who had completed the first survey received a second identical survey. Once again, the research firm waited to receive the survey from the miner by mail. However, some miners had to be contacted so that the survey could be completed over the phone. A second custom-printed mining decal was provided to those completing the second survey.

It was desirable that miners receive additional exposure to the messages beyond just the postcards (Hornik, 2002). Therefore, we created 2′ by 3′ poster-sized versions of the front of each postcard. Safety representatives placed posters in and around locations frequented by miners while they were working (e.g., locker rooms, time card sites, drinking fountains). Quality control processes ensured that safety representatives received posters identical to the two messages assigned to the mine. These poster-sized messages were identical to the two postcards received by miners in the mail. Since the mines were randomly assigned to a condition, they received posters of only the postcards the miners from that mine were receiving. This was an easy and efficient way to increase exposure to the messages beyond the postcards received in the mail. Importantly, this prevented contamination of the stimuli among conditions.

2.3. Participants

The total number of completions after the initial survey was 324 (POS n=90; NEG n=82; NEUT n=82; CTRL n=70). Response rate to the initial survey was 28%. The number of completions of the follow-up survey, which occurred six weeks later, was 246 (POS n=66; NEG n=69; NEUT n=57; CTRL n=54). All miners were male. The average age was 50 (SE=5.9) and almost all respondents (98%) identified their race as White/European-American with only a slight representation of Black/African-American or Native American. Most respondents (90%) were married. The majority of miners had completed high school (44.2%) or some college (30.6%) while others completed some high school (10.3%), vocational school (9.9%), or held a college degree (5.0%). The average amount of time spent working in a mine was 24.7 years (SD=6.8).

2.4. Stimulus messages

We used postcards to present the hearing protection message. The experimental message was conveyed on the

[1] We initially began with a list of 28 mines. But incomplete or missing addresses or phone numbers led us to drop 5 of the 28 mines. These five miners fell below our self-established threshold of 100, which we established to ensure an adequate number of miners were available from each mine.

[2] In most laboratory experiments assessing the effectiveness of persuasive messages, exposure is forced by asking respondents to underline passages and/or write summaries of the message manipulations to ensure that the manipulations were processed (see Witte, 1994). The strategy employed here tried to mimic this standard experimental procedure in the field setting by affixing the postcards to the surveys to reinforce the experimental manipulation.

front side of a 6 by 8 inch postcard. Each message contained a short phrase and an accompanying picture, both in color. All postcard fronts included a phrase like "it ALWAYS helps to wear hearing protection." Additionally, postcard fronts contained the NIOSH and the CDC symbol, phone number, and return address. Space was left to affix mailing labels to which postcards would be mailed (see Figs. 1 through 3).

The back of all postcards contained a message containing a text-only message about voluntary hearing protection and was printed in three colors (red, blue, and black). The text addressed noise-induced hearing loss, the employer's responsibility to control noise levels, and a list of voluntary efficacious behaviors miners could employ to protect their hearing. The NIOSH 1–800 phone number and a web site that listed hearing-testing centers was also included (see Fig. 4).

Postcards were produced professionally by NIOSH computer graphics staff and printed on cardstock. Prior to mailing, the 6 by 8 inch card was folded in half so that the miner's address and the experimental message were on the outside.

2.5. Message validation pilot study

Prior to the main study, all postcard messages were validated in a pilot study with 36 coal miners attending a training seminar in West Virginia. Miners read and rated the affect of 33 different messages created by the research team with approximately an equal amount of negative, positive, and neutral messages. Messages were counterbalanced to avoid an order effect. The entire procedure lasted approximately 40 minutes and participants were paid $25 when they completed the message validation. The final six messages, two representing each of the three message types (POS, NEG, and NEUT), were selected. A unidimensional index of positive affect (happy and glad) and of negative affect (anxious, scared, and upset) was computed for all 33 postcards. While a neutral index was not measured, per se, it was operationalized as low on both the positive and negative affect index.

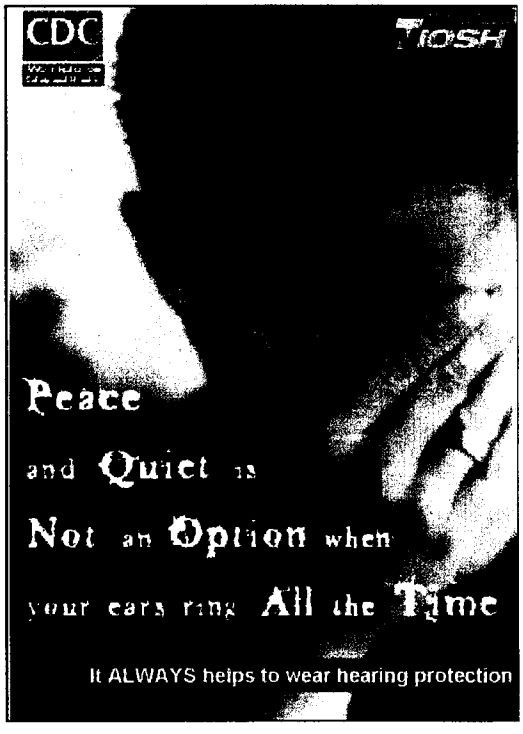

Fig. 2. Negative emotion message.

Fig. 1. Positive emotion message.

Fig. 3. Neutral emotion message.

First, we selected the NEUT messages. Participants scored these two messages as having the lowest positive and negative affect scores, respectively. A paired *t*-test further indicated that the positive and negative indices for both messages were not significantly different from each other (*p* values ranged from .88 to 1.00). In short, recipients felt that these two messages generated little positive or negative affect when viewing them. Therefore, we deemed these two messages as neutral. Second, we selected the two POS and two NEG messages. The two POS messages scored significantly higher on the positive affect index than the two NEUT messages ($p<.05$). Finally, the two NEG messages scored significantly higher on the negative affect index than the two NEUT messages ($p<.001$).

2.6. Measures for main study

2.6.1. Hearing protection behaviors

Miners indicated their current behavior by responding to the following three items on a seven point scale (1=*not at all* to 7=*all of the time*): (a) I wear hearing protection equipment underground; (b) I wear hearing protection to prevent hearing loss; and (c) I regularly use hearing protection in the mine.

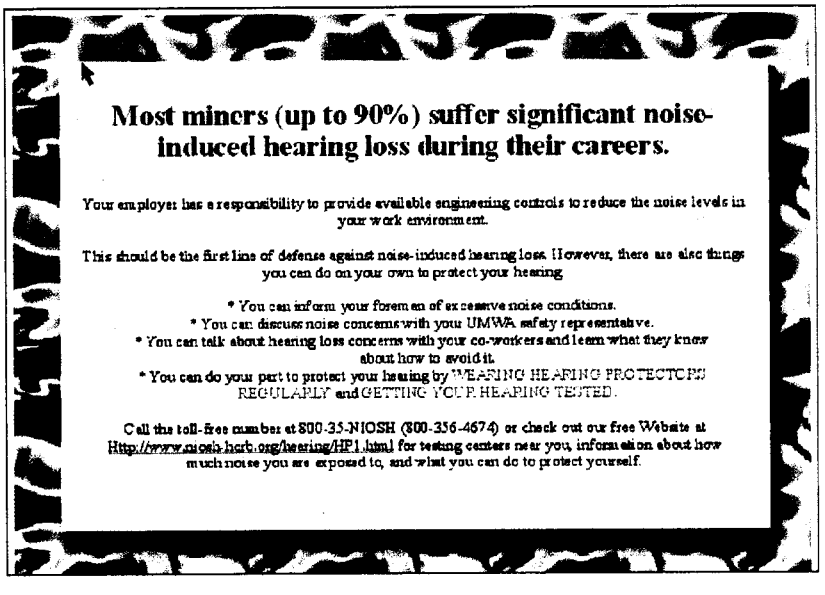

Fig. 4. Backside of all postcards.

These items formed a reliable composite initially (α=.88) and at the follow-up six weeks later (α=.88).

2.6.2. Behavioral intentions

Miners indicated their behavioral intent to wear hearing protection with the following item on a seven-point scale (1=*strongly disagree* to 7=*strongly agree*): I intend to wear hearing protection regularly.

2.6.3. Attitudes toward hearing protection

Attitudes toward hearing protection formed a reliable scale at the initial assessment (α=.68) and at the follow up (α=.69). On a seven point scale (1=*strongly disagree* to 7=*strongly agree*), miners indicated their attitudes through the following four items: (a) wearing hearing protection is good; (b) wearing hearing protection is desirable; (c) wearing hearing protection is bad (reverse coded); and (d) wearing hearing protection is positive.

2.6.4. Perceived manipulation

The following item assessed perceived manipulation on a seven-point scale (1=*strongly disagree* to 7=*strongly agree*): I feel manipulated into wearing hearing protection.

2.6.5. Message distortion

The following item assessed message distortion on a seven-point scale (1=*strongly disagree* to 7=*strongly agree*): Safety campaigns exaggerate the problem of hearing loss.

2.6.6. Covariates

Since the new mining regulations had been put in place approximately 18 months prior to the postcard campaign, prior knowledge of the regulations was used as a covariate with response options of yes or no to the following: I knew about the new hearing regulations before receiving the postcards.

2.6.7. Demographics

Standard demographic data including sex, ethnicity, age, education, marital status, children, and time employed in the mine was collected.

2.7. Data analysis for main study

Data were analyzed with Multivariate Analysis of Variance (MANOVA). Attitudes, behavioral intentions, and self-reported behaviors were correlated at the posttest and at the six-week follow up, with Pearson *r's* ranging from .28 to .70. Similarly, perceived manipulation and message distortion were correlated from .26 to .29. Given these associations, we employed two separate MANOVAs to assess the multivariate effect prior to examining the univariate outcomes. Prior knowledge about the hearing regulations was entered as a covariate initially (hence, MANCOVAs), but it was removed if it was statistically nonsignificant. When the omnibus univariate *F* was statistically significant, a post-hoc test ascertained which groups differed significantly. It is important to note that field experiments involve more "noise" than lab experiments, and this often inflates random error (Kerlinger, 1964). Therefore, we report a small number of outcomes that are statistically significant at p=.06. Appropriately, those outcomes are noted below.

3. Results

3.1. RQ1 and RQ2: Comparative effectiveness and longevity of effect

RQ1 focused on the comparative effectiveness of positive (POS), negative (NEG), and neutral (NEUT) messages to a no-message CTRL group. Of equal interest was the longevity of the effects and whether the outcomes at the first assessment would hold for the second assessment conducted six weeks later (RQ2). We report the outcomes for the three dependent variables: self-reported hearing protection behaviors, behavioral intentions, and positive attitudes. (See Table 1 for an overview of conditions over time.)

The multivariate effect for the linear combination of self-reported behavior, behavioral intentions, and attitudes was statistically significant for the initial posttest, Wilks' λ=.93, F (9, 752)=2.62, p<.001, partial η^2=.03. The multivariate effect, however, was not statistically significant for the follow-up condition.

Table 1
Immediate (Time 1) and delayed (Time 2) posttest marginal means by experimental condition

Outcome	Message type					
	POS	NEG	NEUT	CTRL	F	partial η^2
Behaviors						
Time 1	5.22	4.29	5.04	4.48	5.49***	.05
Time 2	5.30	4.62	5.34	4.73	3.19*	.04
Intentions						
Time 1	5.91	5.47	5.98	5.40	2.95*	.03
Time 2	6.15	5.58	5.96	5.45	2.98*	.04
Attitudes						
Time 1	6.28	6.19	6.30	5.92	2.75*	.03
Time 2	6.31	6.05	6.26	5.93	2.28	.03
Perceived Manipulation						
Time 1	2.35	2.57	2.78	2.72	.80	.00
Time 2	1.92	2.78	2.70	2.85	3.63**	.04
Message Distortion						
Time 1	2.36	2.59	2.33	2.48	.37	.00
Time 2	2.30	2.31	2.57	3.18	2.59*	.04

* p<.05.
** p<.01.
*** p<.001.

3.1.1. Self-reported change in hearing protection

Hearing protection behaviors at the initial assessment varied significantly by postcard condition, F (3, 311)=5.49, p=.001, partial η^2=.05. Coal miners receiving the POS (M=5.22, SE=.19) and NEUT postcards (M=5.04, SE=.19) reported wearing hearing protection significantly more regularly compared to those receiving NEG (M=4.29, SE=.18) or those in the no-postcard CTRL condition (M=4.48, SE=.20).

The findings at the follow-up were similar to those detected initially, F (3, 239)=3.19, p=.03, partial η^2=.04. Miners who received the POS (M=5.30, SE=.20) and NEUT postcards (M=5.34, SE=.22) reported significantly more hearing protection behaviors than those who received the NEG postcards (M=4.62, SE=.20) or those in the no postcard CTRL condition[3] (M=4.73, SE=.22).

3.1.2. Behavioral intentions

Behavioral intentions to use hearing protection at the initial assessment varied significantly by condition, F (3, 311)=2.95, p=.03, partial η^2=.03. Coal miners who received the POS postcards (M=5.91, SE=.17) and the NEUT postcards (M=5.98, SE=.17) reported significantly stronger intentions to wearing hearing protection regularly than did miners who received the NEG postcards[4] (M=5.47, SE=.16) or those in the no-postcard CTRL condition (M=5.40, SE=.18).

Behavioral intentions also varied significantly by condition at the follow-up assessment, F (3, 239)=2.98, p<.05, partial η^2=.04 with prior knowledge as a significant covariate. This time, however, miners who received POS postcards (M=6.15, SE=.19) reported significantly stronger intentions than miners who had received the NEG postcards (M=5.58, SE=.18) or those receiving no-postcard CTRL (M=5.45, SE=.20). Those who had received the NEUT postcards did not vary significantly from any of the other groups (M=5.96, SE=.19).

3.1.3. Attitudes

In the initial assessment, attitudes toward hearing protection varied significantly by postcard condition, F (3, 311)=2.75, p<.05, partial η^2=.03. Miners who received the POS postcards (M=6.28, SE=.10), NEUT postcards (M=6.30, SE=.10), and NEG postcards (M=6.19, SE=.10) reported attitudes that were not significantly different from each other although they all were more favorable than miners in the no postcard CTRL condition (M=5.92, SE=.11).[5] In the six-week follow-up assessment, differences in attitudes toward hearing protection only approached significance, F (3, 242)=2.28, p=.08, partial η^2=.03.

3.2. RQ3 and RQ4: Defensive mechanisms and longevity of effect

The third and fourth research questions sought information on the defensive mechanisms typically associated with persuasive messages (RQ3). Also of interest was the extent to which any of the defensive mechanisms had lasting effects (RQ4).

Statistically, the multivariate effect for the linear composite comprised of perceived manipulation and message distortion was not significant. However, the multivariate effect at the follow-up assessment was significant, Wilks' λ=.93, F (6, 478)=2.91, p<.01, partial η^2=.04.

3.2.1. Perceived manipulation

At the first assessment, no significant differences in perceived manipulation were detected. At the six-week follow-up, however, perceived manipulation varied significantly among groups, F (3, 240)=3.63, p=.01, partial η^2=04. Miners who received the POS postcards (M=1.92, SE=.22) reported significantly less perceived manipulation than those who received the NEG postcards (M=2.78, SE=.21), the NEUT postcards (M=2.70, SE=.24), and the no postcard CTRL condition (M=2.85, SE=.24).

3.2.2. Message distortion

At the first assessment, no significant differences in message distortion emerged. At the follow-up, message distortion varied significantly by condition, F (3, 240)=2.59, p=.05, partial η^2=.03. Miners who received the POS (M=2.30, SE=.24) or the NEG postcards (M=2.31, SE=.23) reported significantly less message distortion than those in the no-postcard CTRL condition (M=3.18, SE=.26). Miners who received the NEUT postcards (M=2.57, SE=.25) did not differ significantly with the other message conditions.

4. Discussion

The primary goal of this field experiment was to compare effects of positive, negative, and neutral persuasive appeals on the hearing-related attitudes, intentions, and self-reported behaviors of Appalachian coal miners (RQ1). Secondarily, we sought to determine if any of these outcomes could be detected six weeks later at the follow-up assessment (RQ2). Finally, it was of interest to investigate how the three emotion-based appeals differed with respect to controlling defense mechanisms that are sometimes detected with negative messages (RQ3) and whether those effects were also detected six weeks later at the follow-up assessment (RQ4).

[3] The significance level between the POS and the CTRL condition was p=.06.

[4] The significance level between the POS and the NEG condition was p=.06.

[5] The significance level between the NEG and the CTRL condition was p=.06.

4.1. Message type and duration of effects

Self-reports of hearing-protection behaviors were significantly greater for those receiving the positive and negative messages than for those who received negative messages. This outcome was robust; it was observed at both the initial assessment and at the six-week follow up. Variance explained was modest, but respectable, for a field experiment employing only postcards and posters. Across all self-reported behaviors, the negative messages were no more effective than the no-message control. Behavioral intention measures paralleled those of self-reported behavior change. Behavioral intentions to engage in hearing-protection behaviors were most influenced by positive messages and neutral messages, with little difference detected between the negative and no-message control conditions. In short, the positive and the neutral postcards were more successful than negative messages in this field experiment.

Despite the consistency for self-reported behaviors and behavioral intentions, the attitudinal outcomes did not mirror their counterparts. Instead, all three experimental message conditions generated similar attitudinal outcomes, and attitudes were significantly more positive in the experimental conditions than in the no-message control group. No differences emerged at the follow-up assessment. The murky outcome detected for the attitudinal data may be explained by an observed ceiling effect on attitudes toward hearing protection. Mean attitude scores for all three experimental conditions were above 6 on a 7-point scale. Given the loud and pervasive levels of noise experienced underground in the mines, few would be likely to report negative feelings toward hearing protection. In short, the data indicate the attitudes are already favorable toward this topic.

4.2. Defensive mechanisms

Regarding defensive mechanisms often associated with persuasive appeals (RQ3), there were no differences in perceived manipulation or message distortion between experimental or control groups. Defensive mechanisms, therefore, were minimal at the outset.

The follow-up assessment (RQ4), however, was far different. Indeed, only the positive message consistently kept the defensive mechanisms at bay. In fact, perceived manipulation actually dropped considerably from the initial to the follow up for the positive condition. For message distortion, positive message recipients remained the same over time although an increase was apparent for the neutral and control conditions. We speculate that heightened concern or fear about hearing loss emerged among individuals (except in the positive condition) after reading about hearing loss and how to prevent it, although subsequent research would be needed to verify this explanation.

4.3. Impact on industry

Campaigners and practitioners often face the issue of how to most effectively persuade a target audience to engage in a specific health-related behavior. It seems to be almost natural for individuals to turn to negative messages to try and induce behavior change. There is something intuitively appealing to health message designers about using scary or gory images or very sad stories to convert the masses (Stephenson & Witte, 2001). Indeed, theorists have made much progress when using these appeals properly (Witte, 1992, 1994). Still, the outcomes of this research inquiry intimate that negative-based appeals may not always be as effective as positive appeals. Of course our conclusions are tentative to the extent that this is a single study (albeit methodologically sound) based on a single topic. Yet we were able to introduce the need for miners to engage in voluntary hearing protection behaviors most effectively with positive message appeals when compared to the negative and neutral emotion-based appeals.

Perhaps the most important practical application that emerges from this study is that this is a campaign approach that is both efficient and affordable. This is important given that most campaigns operate on a shoestring budget, regardless of whether they operate out of a community clinic or an academic researcher's office. The impact of two postcards that were mailed a week apart, combined with posters that were placed at the miners' worksites, elicited the desired intended outcome: self-reported behavior change. Likewise, campaigners can use postcards to test a multitude of theory-based messages in large field settings (see Maibach & Parrott, 1995). In short, researchers gain both internal validity (provided the messages are pretested) and external validity at a cost of next to nothing.

4.4. Limitations

The low response rate to the initial mailing was inherently problematic. Despite preliminary notification, personalizing the request, and offering an incentive, we obtained only 28% of the original sample. Although this response rate is not atypical of mail surveys (Bourque & Fielder, 1995; Frey, Botan, & Kreps, 2000), the primary validity issue is the likelihood of a biased sample. The problem was compounded with the loss of 78 miners from the initial assessment to the follow up. Other limitations include single-item measures for behavioral intentions, perceived manipulation, and message distortion. Additionally, given the number of questions in the survey instrument and the nature of the field study, we were not able to assess mediating factors like cognitions or affect. Fortunately, most theoretical research on affect and persuasive message processing has examined these mediating factors in experimental research where these variables are of high importance. The nature of our field study

made it more appropriate that we focus on other outcome variables.

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