Correcting Over 50 Years of Tobacco Industry Misinformation

Philip Smith, MS, Maansi Bansal-Travers, PhD, Richard O'Connor, PhD, Anthony Brown, BS, Chris Banthin, JD, Sara Guardino-Colket, JD, K. Michael Cummings, PhD, MPH

Background: In 2006, a U.S. Federal Court ruled that the major domestic cigarette manufacturers were guilty of conspiring to deny, distort, and minimize the hazards of cigarette smoking to the public and ordered corrective statements to correct these deceptions.

Purpose: This study evaluates the effectiveness of different versions of corrective statements that were proposed to the Court.

Methods: 239 adult smokers (aged 18–65 years) were randomized to view one of five different versions of corrective statements on five topics (health risks, addiction, low-tar cigarettes, product manipulation, and secondhand smoke); change in knowledge and beliefs were measured before and after viewing the statements, as well as 1 week later. Three of the versions were text-based statements recommended by different parties in the case (Philip Morris, U.S. Department of Justice [DOJ], Interveners), whereas two others were developed at Roswell Park Cancer Institute (RPCI) for this study and utilized pictorial images (emotive and neutral). Data collection and analysis were conducted in Buffalo NY from 2008 to 2009.

Results: Regardless of which corrective statement was seen, exposure resulted in a consistent pattern of increased level of knowledge and corrected misperceptions about smoking, although the effects were not large and diminished back toward baseline levels within 1 week. The DOJ, Interveners, and emotive statements elicited a stronger affective response and were rated by respondents as more persuasive (p-value<0.05). The emotive statement was better recalled and drew the respondents' attention in the shortest amount of time.

Conclusions: Each of the proposed corrective statements tested helped correct false beliefs about smoking, but sustained impact will likely require repeated exposures to the message.

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Introduction

In 1994, chief executives of the major U.S. tobacco companies testified before Congress that the evidence linking cigarette smoking to diseases such as cancer and heart disease was inconclusive, that cigarettes were not addictive, and that they did not market to children.[1–4] However, shortly thereafter internal documents came to light that these claims were not truthful.[1–3,5–10] The documents, including those subsequently released as part of the 1998 Master Settlement Agreement, revealed that the tobacco companies participated in an elaborate conspiracy to confuse the public about smoking and health.[3,11,12]

In 1999, the U.S. Department of Justice (DOJ) filed a lawsuit against the tobacco industry for violating the Racketeer Influenced and Corrupt Organizations (RICO) Act. The DOJ alleged that virtually all of the major domestic cigarette manufacturers had conspired to deceive the American public about the health risks of smoking in violation of the Federal RICO Act. In August 2006, U.S. District Judge Gladys Kessler ruled in favor of the DOJ, concluding that "the tobacco companies conspired to violate the substantive provisions of RICO . . . and . . . in fact violated those substantive provisions."[11] In her rul-

From the Department of Health Behavior, School of Public Health and Health Professions, State University of New York at Buffalo (Smith); Department of Health Behavior, Division of Cancer Prevention and Population Sciences, Roswell Park Cancer Institute (Bansal-Travers, O'Connor, Brown, Cummings), Buffalo, New York; and Public Health Advocacy Institute, Inc., Northeastern University School of Law (Banthin, Guardino-Colket), Boston, Massachusetts

Address correspondence to: K. Michael Cummings, PhD, MPH, Department of Health Behavior, Division of Cancer Prevention and Population Sciences, Roswell Park Cancer Institute, Elm and Carlton streets, Buffalo NY 14263. E-mail: michael.cummings@roswellpark.org.

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ing, Judge Kessler observed that the practices of the tobacco companies had not changed materially. A notable finding of the court was that the tobacco companies were likely to continue racketeering if steps were not taken to change their conduct and to reverse the public's misconceptions about smoking and health.

Judge Kessler ordered the Defendants to publish corrective statements in newspapers, advertisements, TV, on or inside cigarette packaging, in retail displays, and on their corporate websites, to address and correct misperceptions on five topics: (1) adverse health effects caused by smoking; (2) adverse health effects caused by exposure to secondhand smoke; (3) manipulation of the physical and chemical design features of cigarettes; (4) addiction; and (5) fallaciousness of "light" and "low tar" cigarette marketing. The court received suggested messages from three different groups: (1) the DOJ (Plaintiffs); (2) cigarette manufacturers (Defendants); and a (3) a consortium of public health agencies (Interveners: Tobacco-Free Kids Action Fund, American Cancer Society, American Heart Association, American Lung Association, Americans for Nonsmokers' Rights, and the National African American Tobacco Prevention Network). As of this writing, implementation of the remedies is delayed pending an appeal of the proposed remedies.[13]

The use of corrective statement advertising is a common remedy proposed in litigation where the defendant's actions are alleged to have caused consumers to make decisions based on false or misleading information.[14] Corrective statements have been ordered by the Federal Trade Commission when single, specific advertising campaigns have contained misleading information about various products.[14] Several studies[15–20] have evaluated past corrective statement campaigns, generally finding that such statements indeed can have a corrective effect on consumer's knowledge and beliefs. However, unlike previous corrective-statement campaigns, the tobacco industry corrective statements have the challenge of attempting to correct decades of industry misrepresentations on a variety of smoking and health issues. The findings from the health communications literature suggest that the effectiveness of the tobacco industry corrective statements can be enhanced by using statements and advertising formats that elicit an emotional response from the target audience.[21–24]

This exploratory study had three objectives: (1) to document misperceptions that smokers hold about cigarette smoking; (2) to evaluate if the corrective statements ordered by the court can change false beliefs about smoking; and (3) to compare the relative effectiveness of different proposed corrective-statement ads (i.e., both content and style). Based on previous studies evaluating methods of effectively communicating information to smokers through health warning labels and educational materials,[24–31] it was hypothesized that the use of pictorial images depicting the negative consequences of smoking would be rated as most effective both in terms of correcting misperceptions and also recall of the information communicated.

Methods

The study compared five different versions of corrective statements, two proposed by different parties to the DOJ case (Philip Morris and DOJ); one proposed by an independent group of public health experts (Interveners); and two other versions proposed by the study investigators, using pictorial images (emotive and neutral). Of the two pictorial ads, the emotive one featured a testimonial-style message designed to elicit a negative affective response, whereas the neutral one featured an image of a physician, designed to elicit a more neutral affective response. The images were pretested prior to the main study to ensure that they differed on affective response as measured by the Self-Assessment Manikin.[32] Appendix A (available online at www.ajpmonline.org) provides the actual text submitted to the court for each of the five mandated topics to be addressed by the corrective statements (health risks, addiction, low-tar cigarettes, product manipulation, and secondhand smoke), and Figure 1 illustrates the five statements developed to address the topic of low-tar cigarettes.

Study participants included 239 adult smokers (aged 18–65 years) who were randomized to one of five different versions of corrective statements (Philip Morris USA, DOJ, Interveners, RPCI [Roswell Park Cancer Institute] emotive, RPCI neutral) and asked to rate the statements on various dimensions. A subsample of 47 participants was recruited to an eye-tracking study of the different corrective-statement ads. The study was conducted in Buffalo NY in 2008; data were analyzed from 2008 to 2009. This study was approved by the RPCI IRB to safeguard the rights of all participants.

Recruitment of Participants

Between June and October 2008, participants were recruited for this study through ads placed in local newspapers, fliers on public bulletin boards, and phone calls to smokers who previously consented to be recontacted for future studies. Eligible participants had to be aged 18–65 years, report having smoked at least 100 cigarettes in their lifetime, and currently report smoking every day. In addition, participants had to be English literate and could not wear colored contacts, hard contact lenses, or trifocals (requirement for eye-tracking method).

Study Protocol

Randomization for this study was conducted in two steps. First, the five versions of the statements (Philip Morris USA, DOJ, Interveners, RPCI emotive, RPCI neutral) were distributed across the study period, each assigned to a day of the week using balanced Latin-squares. Second, participants were enrolled as they called, based on availability. Because each version was distributed in a balanced manner over the study period, and participants were assigned randomly to their group session, it is reasonable to assume that participants were equally likely to view a given version of the

Figure 1. The five corrective statement ads used to address the topic of low-tar cigarettes
RPCI, Roswell Park Cancer Institute

statements. Of the 239 participants enrolled in the study, 192 viewed the corrective statements in groups of four to 12 participants, whereas the remaining 47 participants viewed the statements individually using the eye-tracking equipment. As shown in Figure 1, the ads were designed to look like a full-page advertisement in a newspaper. In the group session, participants actually

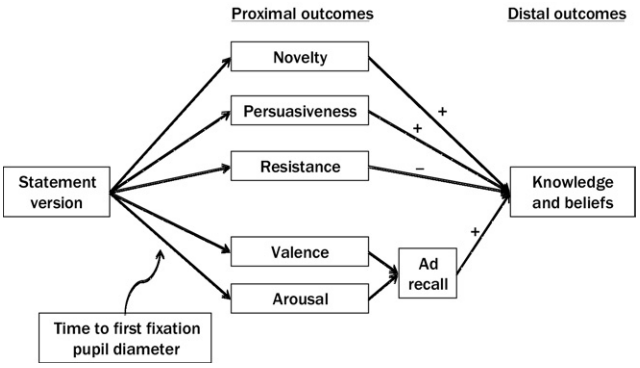

Figure 2. Conceptual model for the study

were given a newspaper section with the corrective-statement ads pasted into the newspaper.

On arrival at the group sessions, conducted at the Roswell Park Cancer Institute, written consent was obtained and participants completed a pre-session survey assessing demographics, smoking characteristics, beliefs about the five targeted topics, and beliefs about tobacco industry practices and regulation. Next, participants viewed each of the five statements in their assigned version for 15 seconds. After each statement, participants rated affective response and opinions about the persuasiveness, novelty, and resistance to the statement. After viewing all five statements, the participants completed a postsession survey and received a $20 gift card as compensation.

Approximately 1 week after the study session, participants were contacted by telephone to complete a 10-minute survey assessing ad recall and knowledge and beliefs about cigarettes and the health risks of smoking. Those who completed the 1-week follow-up telephone interview (n=198; response rate=83%) received a $10 check as compensation.

Outcome Measures

Figure 2 provides a conceptual model illustrating how the various corrective statements were anticipated to relate to both proximal and distal outcome measures. Overall, the relative impact of the different statements on distal measures of effect such as changes in knowledge and beliefs was expected to be mediated through more proximal indicators of how ads were rated in terms of persuasiveness, novelty, and resistance to the message, as well as evoking different emotional reactions (as measured by valence and arousal). It was hypothesized that differences in novelty, persuasiveness, resistance, valence, and arousal would show relationships with changes in knowledge and beliefs as a result of the intervention. Finally, this study sought to examine whether more emotionally engaging ads would show better recall with time, leading to more sustained change in knowledge or beliefs. Eye-tracking data also were used to examine how different messages might bring about different affective responses. Appendix B (available online at www.ajpmonline.org) enumerates the measures used in this study and provides reliability assessments for the items underlying these constructs.

Proximal outcomes—reactions to advertisement. Measures used to evaluate respondents' ratings of the persuasiveness, novelty, and resistance to each of the five corrective statement ads were adapted from previous communications evaluations conducted by Wakefield et al.[33] Ad response was also evaluated by measuring affective response using the valence and arousal dimensions of the Self-Assessment Manikin.[32]

Distal outcomes—content-specific knowledge and beliefs. Knowledge and beliefs were assessed before viewing the statements, immediately after, and 1 week later. These outcomes addressed the health risks of smoking, nicotine addiction, low-tar cigarettes, product manipulation, secondhand smoke health risks, and tobacco industry beliefs.

Ad recall. Unaided and aided recall was assessed at the beginning of the 1-week follow-up telephone interview. For unaided recall, participants were asked what they remembered from the advertisements, with responses coded by two independent raters (kappa = 0.86) into three categories: did not recall anything, provided a general statement about the dangers of smoking, or recalled a specific item from a corrective statement. Aided recall was assessed after the unaided recall question by asking respondents about specific topics covered in the statements.

Eye-tracking substudy. This study used eye-tracking technology to capture real-time dimensions of the viewer's experience such as pupil diameter and gaze patterns, which can be used as markers for emotional arousal[34–37] and attention.[38–41] Eye-tracking data were collected using an ASL Eyetracker 6000 system with an H6 headset (Applied Science Laboratories, Bedford MA). Participants in the eye-tracking study viewed the corrective statements on a computer screen as high-resolution images of the corrective statements embedded in real newspapers. All other procedures were identical to the group sessions. Pupil diameter (in mm) was measured by the eye-tracking equipment 60 times per second as the participants viewed the corrective statements. Time to first fixation was measured as latency before a participant noticed the first corrective statement. This measure was analyzed as a proxy for the statement's ability to draw the attention of the viewer relative to other elements of the page image.

Data Analysis

Data analyses were performed using SPSS, version 14.0. Descriptive analyses are based on percentages and means. Differences between statement versions were tested using chi-square test statistic or ANOVA, depending on whether the outcome variable was categoric or continuous. The study sample was split equally between men and women, with 49% self-reported as white, non-Hispanic and 43% as black, non-Hispanic. The mean age of the sample was 42 years and 37% had less than a high school education. Eighty-one percent smoked at least a pack of cigarettes per day; more than half (58%) tried to quit in the last year; and 63% were thinking of quitting within the next 6 months. In addition, comparisons of participants in group versus eye-tracking settings were made by t-tests and shown not to differ significantly at baseline, postsession, or follow-up. Therefore, the results presented pool group and eye-tracking responses.

This analysis employed a factorial design with two factors: (1) time of assessment, which included three categories: baseline, immediate postsession, and 1-week follow-up (measured within subjects); and (2) corrective statement version, which included five categories: DOJ, Phillip Morris USA, Interveners, RPCI emotive, RPCI neutral (measured between subjects). The overall effect of message across time (main effect of version), the overall effect of

Table 1. Comparison of ad rating responses between groups for Knowledge of Health Risks from Smoking and Knowledge of Health Risks from Secondhand Smoke Indices

	Corrective statement: health risks from smoking					Corrective statement: health risks from secondhand smoke				
	Persuasion[a] (0–3)	Novelty[a] (0–3)	Resistance (0–3)	Arousal[a] (0–4)	Valence[a] (0–4)	Persuasion (0–3)	Novelty (0–3)	Resistance (0–3)	Arousal (0–4)	Valence (0–4)
DOJ	2.26	1.81	1.91	3.58	3.12	2.12	1.65	1.86	3.36	2.95
RPCI emotive	2.12	1.41	1.85	3.38	2.83	1.96	1.34	1.88	3.20	2.98
Philip Morris USA	1.88	1.02	2.04	2.83	2.48	1.98	1.54	1.76	3.04	2.72
Interveners	2.27	1.63	1.86	3.30	2.96	2.23	1.48	1.96	3.06	2.67
RPCI neutral	2.02	1.37	2.03	2.90	2.48	1.98	1.24	1.98	3.02	2.42

[a]Significant differences were detected among the five versions for the ad rating scale, ANOVA, p-value<0.05.
DOJ, Department of Justice; RPCI, Roswell Park Cancer Institute

change with time across versions (main effect of session), and the relative rates of change between versions across sessions (interaction between version and session) were tested using repeated measures ANOVA. The Greenhouse–Geisser correction was applied to the p-values reported from the repeated measures analysis. Also, because of the large number of outcome measures assessed and the exploratory nature of the study, the Sidak test was applied to adjust for experiment-wise error from multiple statistical testing.[42]

Results

Baseline Levels of Knowledge and Beliefs

As a whole, the study sample showed important deficits in knowledge and beliefs about smoking. For example, nearly half of the study population (48%) either agreed or strongly agreed with the statement "nicotine is only a minor factor in whether a person can stop smoking." Nearly one third of the study population (29%) reported that their chances of getting sick were the same as other, nonsmoking adults, and nearly two thirds (63%) did not know that secondhand smoke exposure can cause heart attacks. Thirty-nine percent did not know that the amount of nicotine a smoker inhales depends on how they smoke, and 35% believed that filters reduce the harmful effects of cigarettes. About half (45%) of the participants disagreed with the statement "one low tar cigarette delivers as much tar as one full flavor cigarette," and 61% believed that the word "light" on a cigarette package means that the smoker gets less tar. No significant differences were observed among the groups assigned to the different versions of the corrective-statement ads on demographic or baseline measures of beliefs; however, significant differences were found between the corrective-statement versions on baseline levels of knowledge (Knowledge of Health Risks from Smoking: $F=2.53$, p-value$=0.04$; Knowledge of Health Risks from SHS: $F=4.17$, p-value<0.01).

Ad Ratings: Persuasion, Novelty, and Resistance

Table 1 displays results of ad ratings for the corrective statements addressing the health risks from smoking and those from secondhand smoke. ANOVA tests detected significant differences in persuasion, novelty, valence, and arousal ratings among the versions for the corrective statement addressing health risks from smoking (p-value<0.05). Participants exposed to the DOJ, RPCI emotive, and Intervener ads reported a more negative and a more highly arousing emotional response to the corrective statements compared to participants exposed to either the Philip Morris or RPCI neutral pictorial corrective statement ads.

Eye-Tracking Substudy

Participants who saw the DOJ, Intervener, and RPCI emotive versions of the corrective statements exhibited a consistently larger mean pupil diameter compared to participants exposed to the Philip Morris and RPCI Neutral pictorial corrective statement ads after controlling for differences in luminance. These findings are consistent with those for the ad ratings. Also, those who saw the RPCI emotive statement consistently took less time to locate and look at the corrective statement portion of the ad compared to participants who saw the other four corrective statement ads. However, these differences did not always reach a significance level of $p<0.05$.

Corrective-Statement Effects on Knowledge and Beliefs

As shown in Figure 3, the analyses found a significant time effect for all belief outcome measures. In every case, an increase in scores was observed immediately after

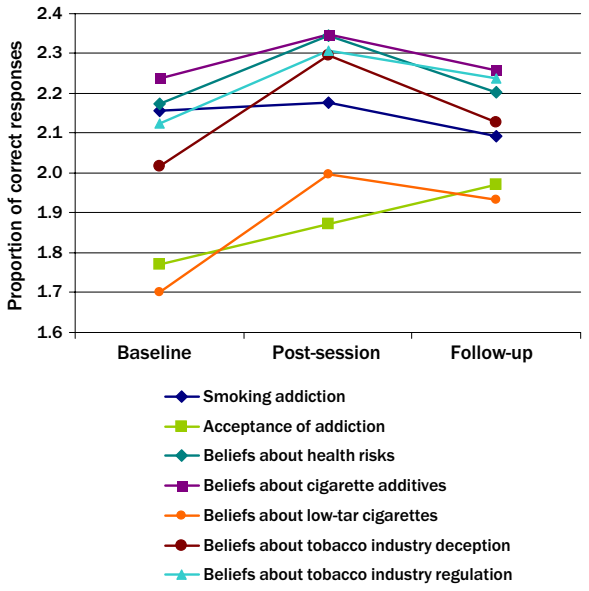

Figure 3. Grand means for individual belief index scores across all versions of the corrective statements for each session

participants viewed the corrective statements, followed by a slight decline 1 week later.

There were no time (i.e., session) by ad version effect interactions detected for the belief measures. In other words, participants responded to each of the five corrective statements in a similar manner on all belief outcomes, with an increase in belief scores initially followed by a return to baseline levels at the 1-week follow-up.

Figures 4 and 5 show the two time by corrective statement interactions that were detected. Follow-up repeated measures analysis by version showed that the change in scores on the Knowledge of Health Risks from Smoking index was significant for those exposed to the DOJ ($F=5.14$, p-value$=0.02$); Philip Morris ($F=6.84$, p-value<0.01); and RPCI emotive ads ($F=6.30$, p-value$=0.01$) but not the Intervener and RPCI neutral corrective statements (Figure 4). Similar follow-up testing for the Knowledge of Health Risks from Secondhand Smoke index showed significant gains in knowledge for those exposed to the DOJ ($F=24.75$, p-value<0.01); Interveners ($F=4.90$, p-value$=0.01$); and Philip Morris ads ($F=12.29$, p-value<0.01) but neither of the RPCI versions (Figure 5).

Additional repeated measures analyses were conducted to evaluate the potential mediating effect of the ad rating scores (persuasion, novelty, resistance, valence, and arousal) on the significant version differences in mean knowledge score changes for the Health Risks from Smoking and Health Risks from Secondhand Smoke indices. These analyses found that independent of differences captured by version, novelty was significantly related to change in the Knowledge of Health Risks from Smoking ($F=3.86$, p-value$=0.02$) and Knowledge of Health Risks from Secondhand Smoke ($F=4.06$, p-value$=0.02$) index scores, as manifested in time–novelty interactions.

Ad Recall

After 1 week, there was a high level of unaided recall of the corrective statements across all five versions. More than half of the participants (56%) who saw the RPCI emotive version recalled a specific detail from the testimonial images in the statements. Participants who saw the Interveners' version were most likely to mention the deceptive practices of the Tobacco Industry (50%). There was no difference in aided recall among the versions presented of the corrective statements.

Discussion

Consistent with previously published studies,[43–45] the findings from this study support the need for corrective statements since the results found that smokers in this sample were misinformed about several smoking and health issues, especially nicotine addiction and light/low-tar cigarettes.

This study also found that all of the corrective statements proposed to the court were effective in correcting false beliefs about smoking and health. Exposure to the corrective statement ads revealed a consistent pattern of increased level of knowledge and corrected misperceptions about smoking, although the effects were not large and diminished back toward baseline levels within 1 week. The only significant differences among the corrective statement ads were found on the two indices of knowledge of health effects outcomes (i.e., diseases caused by smoking and diseases caused by secondhand smoke). The differences

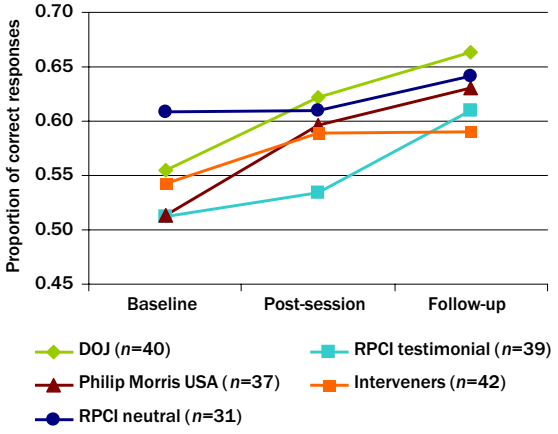

Figure 4. Individual means for knowledge of health risks from smoking for each version of the corrective statements for each session

DOJ, Department of Justice; RPCI, Roswell Park Cancer Institute

observed appear to relate to the actual information contained in the corrective-statement ads. Both the DOJ and Philip Morris ads listed specific health conditions caused by smoking and exposure to secondhand smoke, whereas the Intervener and RPCI ads did not. However, the RPCI emotive ad did pictorially depict an individual ill with a health condition caused by smoking. This finding does suggest that attention should be paid to the ad content. The more consistent observation in this study was a time effect, which suggests that repeated exposure to the corrective statements is likely to be a necessary requisite to ensure that the ad used for the corrective statement is seen more than once, as the effects will diminish quickly.

The tone and style of the corrective statement ad also influenced respondents' ratings of the persuasiveness of the message and affective response to the message. Participants who saw the DOJ, Intervener, and RPCI emotive corrective statement advertisements reported the highest levels of affective response, and rated their statements as most persuasive. The RPCI emotive version was also recalled better 1 week later and, in the eye-tracking substudy, attracted the attention of its viewer in the shortest amount of time. These factors may be important to consider given that the corrective statements, once published, will compete for a person's attention among other communications in the environment. In other words, the speed with which a corrective statement attracts attention and the degree to which it is persuasive should be important evaluation criteria.

Apart from the corrective statements remedies ordered in the Department of Justice lawsuit, this study also supports the use of graphic health warnings in other contexts. For example, the Family Smoking Prevention and Tobacco Control Act of 2009 that gives authority to the FDA to regulate tobacco removes some federal law impediments that previously blocked state and local regulation from warning consumers about the health risks of smoking.[46] Already, the New York City Board of Health has acted on their new authority by requiring tobacco retailers to display graphic tobacco health warnings at the point of purchase.[47] Although the Appeals Court vacated the order in Judge Kessler's decision that required displaying the corrective statements at point-of-sale displays,[13] there is currently no legislation stopping other local and state governments from implementing similar laws. In this context, as with the corrective statements, ensuring consumers are informed about tobacco-related health effects through the use of health warnings means competing for attention, often against a barrage of vivid imagery and in-store designs meant to promote tobacco purchases and use. Given the importance of ensuring repeated exposure to the corrective statements, it would seem reasonable for local health authorities as well as the FDA to consider including the corrective statement advertisements at the point of sale and as an insert in all packs and cartons of cigarettes sold.

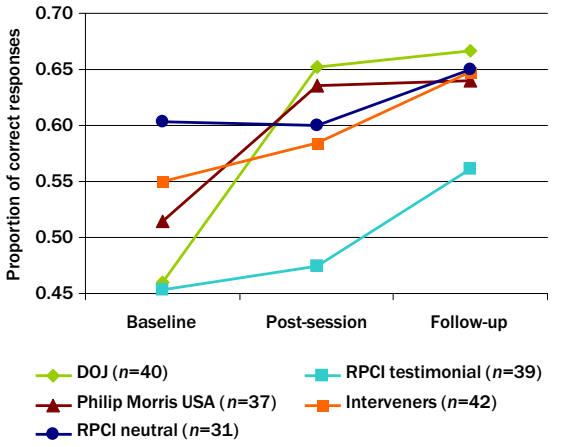

Figure 5. Individual means for knowledge of health risks from secondhand smoke for each version of the corrective statements for each session
DOJ, Department of Justice; RPCI, Roswell Park Cancer Institute

The findings from this study are subject to some limitations. First, this study examined a convenience sample of smokers in one city with relatively comprehensive tobacco control regulations. To ensure that the corrective statements serve the court's intended purpose of correcting the misrepresentations about smoking and health issues, it will be important for the government to have a system in place to track exposure to the corrective statements and monitor their effects on the public, especially smokers.

Second, this study compared the effectiveness of the proposed statements as submitted to the court in layouts that would be conducive to printing in a newspaper. However, these representations may not have been the most ideal in phrasing or layout. For example, the statements in this study were presented to participants as black text on a plain newspaper background. Also, the findings for printed corrective statements may not necessarily generalize to statements in other formats such as radio, TV, and point of sale. Additional research is needed to identify the most effective formats to use in presenting the corrective statement information to consumers. Finally, the corrective statements are designed to address objective misinformation and cannot address the considerable complexity involving personalization of risks from smoking.[48,49]

Overall, the results of the study suggest that corrective statements proposed in the Federal Government's lawsuit have potential to correct misperceptions about smoking and health, and that evoking an emotional response can increase persuasiveness and recall of those statements.

Such findings can be useful as corrective statements move closer to implementation.

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KMC has served in the past and continues to serve as a paid expert witness for plaintiffs in litigation against the tobacco industry.

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Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2011.01.020.