

# Effect of Source Attribution on Judgments of Warning Credibility and Compliance Likelihood

Michael S. WOGALTER<sup>a</sup>, Michael J. KALSHER<sup>b</sup>, and Raheel RASHIDA

<sup>a</sup>*Department of Psychology, North Carolina State University, Raleigh, NC 27695, USA*

<sup>b</sup>*Department of Philosophy, Psychology, and Cognitive Science, Rensselaer Polytechnic Institute, Troy, NY 12180, USA*

**Abstract.** Communication models frequently include the source of a message as an important determinant of persuasion. However, research on the contribution of source characteristics to warning effectiveness is virtually non-existent. The present research investigated three types of sources: (1) specific regulatory governmental agencies (e.g., U.S. FOOD AND DRUG ADMINISTRATION), (2) specific scientific professional groups (e.g., AMERICAN MEDICAL ASSOCIATION), and (3) general statements in which an explicit source is not mentioned (e.g., IMPORTANT HEALTH WARNING). Participants rated 11 sources of the alcohol, cigarette, and iron supplement warnings on credibility and compliance likelihood. The results show that exemplars from the two types of specific sources made the warnings more credible and increased the compliance likelihood ratings compared to a signal word (WARNING) by itself. Having a signal word was better than no signal word. Implications for warning design are discussed.

## 1. Introduction

According to communication-persuasion theory [1], the effectiveness of a message depends in part on the source of that message (i.e., the entity from which the message derives). Warnings are a type of persuasion attempt intended to motivate people to comply with its directives. A warning that fails to persuade could lead to injury, death or property damage. Despite its potential importance, research on source effects in the warnings literature is virtually nonexistent except for two studies [2, 3]. For example, Lirtzman and Shuv-Ami [2] found that sources seen as content-domain experts enhance warning-message credibility.

In recent years, U.S. government has mandated warnings for various products. For two well-known products (cigarettes and beverage alcohol), the warnings include explicit sources as part of the message, i.e., SURGEON GENERAL and/or GOVERNMENT. Until recently, however, there has been no research on whether having an attributable source in the warning (in this case the government) affects warning effectiveness judgments. Recently, Wogalter, Kalsher and Rashid [3] examined the effectiveness of four types of signal word/source attributions: (1) WARNING, (2) GOVERNMENT WARNING, (3) U.S. GOVERNMENT WARNING, (4) U.S. FEDERAL GOVERNMENT WARNING on cigarette, alcohol, and iron warnings. The results showed that adding an attributable source (e.g., U.S. GOVERNMENT) significantly improved the perceived credibility of the warning and compliance likelihood as compared to the signal word alone (WARNING). In addition, the study showed that warnings with the signal word WARNING were given higher ratings than warnings without a signal word.

In this study, we examined three categories of sources: (1) specific regulatory governmental agencies (e.g., U.S. FOOD AND DRUG ADMINISTRATION), specific scientific professional groups (e.g., AMERICAN MEDICAL ASSOCIATION, AMERICAN PEDIATRIC ASSOCIATION), and general statements without a directly attributable source (e.g., IMPORTANT HEALTH WARNING). As in the Wogalter et al. [3] study, the effect of presence vs. absence of the signal word WARNING was also examined. The two dependent measures were perceived credibility and likelihood to comply with the warning. These measures have direct relevance to the communication-persuasion and warnings literatures, respectively.

## 2. Method

### 2.1. Participants

Fifty-seven undergraduates from Rensselaer Polytechnic Institute participated. This group had a mean age of 19.9 years (SD = 1.5). Thirty six were males. Forty-six were Caucasians.

### 2.2. Materials

Participants viewed warning messages for three products: They are shown below.

#### *Alcohol warning*

\_\_\_\_\_ : (1) Women should not drink alcoholic beverages during pregnancy because of the risk of birth defects. (2) Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems.

#### *Cigarette warning*

\_\_\_\_\_ : Cigarette smoke contains carbon monoxide. Smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancy. Smoking by pregnant women may result in fetal injury, premature birth, and low birth weight. Quitting smoking now greatly reduces serious risks to your health.

#### *Iron supplement warning*

\_\_\_\_\_ : Keep away from children. Keep in original package until each use. Contains iron which can harm or cause death to a child. If a child accidentally swallows this product, call a doctor or poison control center.

The above alcohol warning message has been mandated since 1989 to be on all beverage alcohol containers sold in the U.S. The above cigarette warning message combined the four separate messages that have been on packages and advertising for cigarettes since the mid-1980s. The iron warning message was taken from one that the U.S. FDA was considering for iron supplement (e.g., multi-vitamin and mineral) labels.

The warning messages were printed on separate sheets and surrounded by a 4-point rectangular black border. Each had a blank space (underlined) followed by a colon to indicate the location of added prefix wording (if any). Below the warning were the 12 alternative prefixes. Two were controls. One lacked the prefix entirely; only a blank line was given (i.e., no source or signal word). The other control had just the signal word WARNING (but no attributable source). The other 10 alternatives consisted of either specific sources or general statements that were added before the signal word WARNING. There were three specific regulatory government agency prefixes: U.S. SURGEON GENERAL'S, U.S. CONSUMER PRODUCT SAFETY COMMISSION, and U.S. FOOD AND DRUG ADMINISTRATION. There were two specific scientific professional group prefixes: AMERICAN MEDICAL ASSOCIATION, and AMERICAN PEDIATRIC ASSOCIATION. There were six general statement prefixes: HEALTH, SAFETY AND HEALTH, U.S. PUBLIC HEALTH, MEDICAL HEALTH, and IMPORTANT HEALTH.

Credibility and compliance likelihood ratings were made on 9-point scales. The credibility scale was anchored at the even-numbered points with the following verbal descriptions: (0) not at all credible, (2) somewhat credible, (4) credible, (6) very credible, and (8) extremely credible. The compliance likelihood scale had the following anchors: (0) not at all likely, (2) somewhat likely, (4) likely, (6) very likely, (8) extremely likely.

### 2.3. Procedure

Initially participants were asked to read and sign a consent form. They were then told that the purpose of the study was to assess people's impressions of warnings that differed in their wording. After the ratings, participants were asked to complete a demographics questionnaire requesting age, gender, etc. Later, participants were debriefed and thanked.

## 3. Results

### 3.1. Credibility

A 3 (product warning: alcohol, cigarette, and iron supplement) X 12 (prefix) repeated measures analyses of variance (ANOVA) was applied to the credibility ratings. The effect

Table 1

Mean ratings of credibility as a function of product warning and prefix.

Prefix	Warnings			mean
	Alcohol	Cigarette	Iron	
_[blank]_:	2.81	2.95	3.07	2.94
WARNING:	3.51	4.00	4.09	3.87
U.S. SURGEON GENERAL'S WARNING:	5.25	5.72	5.61	5.53
U.S. CONSUMER PRODUCT SAFETY COMMISSION WARNING:	4.49	4.68	5.33	4.84
U.S. FOOD AND DRUG ADMINISTRATION WARNING:	5.25	5.32	5.54	5.37
AMERICAN MEDICAL ASSOCIATION WARNING:	5.53	5.56	5.46	5.51
AMERICAN PEDIATRIC ASSOCIATION WARNING:	5.02	4.95	5.67	5.21
HEALTH WARNING:	4.32	4.44	4.54	4.43
SAFETY AND HEALTH WARNING	4.54	4.56	4.89	4.67
U.S. PUBLIC HEALTH WARNING:	4.75	4.75	4.68	4.73
MEDICAL HEALTH WARNING:	4.74	5.00	4.82	4.85
IMPORTANT HEALTH WARNING:	4.72	4.67	4.72	4.70
mean	4.58	4.72	4.87	

of product warning was not significant,  $F(2, 112) = 2.85, p > .05$ . The ANOVA showed a significant main effect of prefix,  $F(11, 616) = 25.61, p < .0001$ . These means are shown in the right-most column of Table 1. Paired comparisons using the Tukey HSD test ( $p < .05$ ) showed that participants gave higher credibility ratings when the signal word WARNING was present than when it was absent. Adding a general prefix (the words SAFETY AND HEALTH, IMPORTANT HEALTH, and MEDICAL HEALTH) to the signal word significantly increased credibility, although adding the prefix HEALTH to WARNING did not. The four highest rated prefixes (U.S. SURGEON GENERAL'S, AMERICAN MEDICAL ASSOCIATION, U.S. FOOD AND DRUG ADMINISTRATION, and AMERICAN PEDIATRIC ASSOCIATION) were not statistically different from one another, but the two highest-rated sources (U.S. SURGEON GENERAL'S and AMERICAN MEDICAL ASSOCIATION) had significantly higher credibility than the U.S. CONSUMER PRODUCT SAFETY COMMISSION and the U.S. PUBLIC HEALTH prefixes.

The ANOVA also showed a significant interaction,  $F(22, 1232) = 2.73, p < .0001$ . Simple effects analysis showed that the pattern of means was consistent with the main effect of prefix described above except that the AMERICAN PEDIATRIC ASSOCIATION and U.S. CONSUMER PRODUCT SAFETY COMMISSION had significantly higher credibility ratings for the iron product warning than the other two product warnings.

### 3.2. Compliance Likelihood

A 3 (product warning: alcohol, cigarette, and iron supplement) X 12 (prefix) repeated measures ANOVA on the compliance likelihood ratings showed significant main effects of product warning,  $F(2, 112) = 5.20, p < .01$ , and prefix,  $F(11, 616) = 19.09, p < .0001$ . These means are shown on the bottom row and the right-most column of Table 2. The Tukey's test showed that compliance likelihood ratings were significantly higher for the iron than for the cigarette warning. Participants gave higher compliance likelihood ratings when the signal word WARNING was present than when it was absent. All of the source conditions had significantly higher compliance likelihood ratings than the signal word alone, except for the prefix HEALTH. The only other significant differences were between the highest-rated prefix AMERICAN MEDICAL ASSOCIATION and the general prefixes HEALTH, SAFETY AND HEALTH, and IMPORTANT HEALTH.

The ANOVA also showed a significant interaction,  $F(22, 1232) = 2.32, p < .001$ . Simple effects analysis followed by paired comparisons showed that the pattern of means

Table 2

Mean ratings of compliance likelihood as a function of product warning and prefix.

Prefix	Warnings			mean
	Alcohol	Cigarette	Iron	
_[blank]_:	3.53	3.16	3.91	3.53
WARNING:	4.23	3.88	4.79	4.30
U.S. SURGEON GENERAL'S WARNING:	5.33	5.12	5.54	5.33
U.S. CONSUMER PRODUCT SAFETY COMMISSION WARNING:	4.88	4.46	5.79	5.04
U.S. FOOD AND DRUG ADMINISTRATION WARNING:	5.40	5.09	5.51	5.33
AMERICAN MEDICAL ASSOCIATION WARNING:	5.51	5.30	5.84	5.55
AMERICAN PEDIATRIC ASSOCIATION WARNING:	5.16	4.86	5.89	5.30
HEALTH WARNING:	4.81	4.40	5.28	4.83
SAFETY AND HEALTH WARNING:	4.95	4.37	5.44	4.92
U.S. PUBLIC HEALTH WARNING:	5.07	4.53	5.40	5.00
MEDICAL HEALTH WARNING:	5.05	4.61	5.47	5.04
IMPORTANT HEALTH WARNING:	4.95	4.53	5.42	4.96
mean	4.91	4.52	5.36	

was consistent with the main of effects of warning and prefix described above except that the prefixes AMERICAN PEDIATRIC ASSOCIATION and U.S. CONSUMER PRODUCT SAFETY COMMISSION were rated higher for the iron warning than the other two product warnings. The three product warnings did not differ in compliance likelihood for the U.S. SURGEON GENERAL'S, U.S. FOOD AND DRUG ADMINISTRATION, and AMERICAN MEDICAL ASSOCIATION prefixes.

#### 4. Discussion

The results show that a product warning with no source or signal word was rated less credible and produced lower compliance likelihood ratings compared to a warning with the signal word WARNING alone. However, the signal word alone was, in turn, rated less credible and produced lower compliance ratings compared to all of the specific source conditions. Non-attributable general statements produced intermediate ratings. These results are consistent with persuasion research showing that the effectiveness of messages is affected by attributes of the source. Attributing the warning to specific, reputable, expert sources such as the AMERICAN MEDICAL ASSOCIATION and the U.S. FOOD AND DRUG ADMINISTRATION makes the warning more credible and promotes greater compliance likelihood than no source. No significant differences between the scientific professional group sources and the governmental agency sources were found.

Thus, the results suggest that warnings with specific sources increase judged effectiveness. Because warnings are frequently limited in space/area, extra source-related words might preclude other useful information from being included, or it might require the use of smaller size print that could negatively impact legibility and noticeability. These tradeoffs should be considered in designing and evaluating warning content.

#### References

- [1] McGuire, W. J., The Communication-Persuasion Model and Health-Risk Labeling, in L.A. Morris, M.B. Mazis, and I. Barofsky, Cold Spring Harbor Laboratory, (1980), pp. 99-122.
- [2] I. S. Lirtzman and A. Shuv-Ami, Credibility of Sources of Communication on Product Safety Hazards. *Psychological Reports*, 58 (1986) 707-718.
- [3] M. S. Wogalter, Rashid, R. and Kalsher, M. J., Effect of Warning Signal Word and Source on Perceived Credibility and Compliance Likelihood. In *Proceedings of the 13th Triennial Congress International Ergonomics Association* (1997), in press.