Effects of Alcohol Warnings and Advertisements: A Test of the Boomerang Hypothesis

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ABSTRACT

Two experiments examined the effects of warnings and advertisements on memory, intentions, and benefit and risk perceptions. The experiments were designed to replicate an important recent study (Snyder & Blood, 1992), where it was suggested that an alcohol warning may have a boomerang effect such that drinkers perceive alcohol as having more benefits when the warning is present. In Experiment 1, a planned comparison did not support the boomerang effect. A larger sample size was used in Experiment 2 to increase the statistical power to detect the boomerang effect, but the effect was not observed. In both experiments there was evidence that advertisements led to greater perceived benefits and lower perceived risks. There was some evidence that warnings increased perceived risk and reduced advertising effects on perceived benefits. Subjects' sex and alcohol use were often strongly related to the dependent measures. © 1998 John Wiley & Sons, Inc.
engaging, with brightly colored, full-page magazine advertisements and billboards, well-crafted television and radio commercials, and sponsorship of sporting and philanthropic events that associate alcohol use with athleticism, strength, beauty, fun, and sophistication. Some counter-arguments to these appeals are public-service announcements, school and community prevention programs, warning posters, and the above-mentioned federally mandated warning. The federal warning is not present during exposure to the appeals in favor of alcohol use. The purpose of the present research was to examine the effects of warnings and advertisements on perceptions of alcohol’s benefits and risks, memory for warnings, and intentions for alcohol use.

**Effects of Alcohol Warnings**

Some claim that warnings have little or no effect on behavior (Engs, 1989; McCarthy, Finnegan, Krumm-Scott, & McCarthy, 1984) whereas others claim that warnings are appropriate in many situations (Lehto & Miller, 1986). Although behavior change is the primary goal of most warnings, there are many other goals of warnings, including information transmission and satisfaction of duty-to-warn requirements that protect manufacturers in product liability lawsuits (Andreas, 1988). The alcohol warning label, in particular, was designed to inform and remind the public about the risks of alcohol use (Public Law 100-690). Behavior change is not mentioned in the stated goals of the alcohol warning label legislation, though this is a goal from a public health perspective.

A recent review of the effects of the alcohol warning label (MacKinnon, 1995) suggests that people have seen the warning label and have accurate memory for its content. Despite increases in awareness of and memory for the alcohol warning label, past studies have not demonstrated an effect of the warning on risk perceptions (Andrews, 1995). Likewise, changes in drinking behavior attributable to the warning label have not yet been observed.

Some research suggests that the warning label may be counterproductive. A recent study (Snyder & Blood, 1992) reported that the warning may have a boomerang effect such that drinkers perceive alcohol as having more benefits when the warning is present. The benefits dependent variable for which the boomerang effect was found, however, was actually a measure of the perceived benefits of the alcohol products shown on the slides and not the perceived benefits of using alcohol. But Snyder and Blood also found evidence of a boomerang effect on intentions. Male drinkers shown the alcohol warning had greater intentions for alcohol consumption than male drinkers not shown the warning.

There were several limitations to the original article describing the boomerang effect in Snyder and Blood (1992). First, the means and the statistical test of the contrast were not reported for the boomerang effect. Second, subjects who were exposed to the warning but reported
that they did not see it and all subjects older than 22 were dropped from the analysis. More importantly, there were only four male nondrinkers in their study, all of whom were deleted from the statistical analyses. The resulting confound between drinking status and sex precluded use of sex as a variable in the statistical analyses. The confound is important because there is evidence for different effects of warnings for males and females. In general, females are more likely to read and comply with warnings than are males (LaRue & Cohen, 1987; Goldhaber & deTurck, 1988).

A boomerang effect of warning labels was not obtained in a study of alcohol warnings on television advertisements (Smith, 1990) nor in a study of cigarette warnings (Loken & Howard-Pitney, 1988). However, a counterproductive effect of warnings was found for violence warnings on television programs (Bushman & Stack, 1996). Across three studies, violence warning labels increased college student participants' attraction to television programs. The results were consistent with forbidden fruit theory, which, like the boomerang effect, suggests warnings may be counterproductive (i.e., increased desire for those things against which we have been warned). In contrast, Christenson (1992) found evidence for a tainted fruit explanation of warning label effects such that adolescents were less likely to choose music with music warning labels. Counter to the forbidden fruit theory, tainted fruit theory posits that a warning will reduce the attractiveness of the item to which it applies.

Effects of Alcohol Advertisements
Advertising may affect drinking by cultivating certain attitudes and behaviors related to alcohol (Gerbner, Gross, Morgan, & Signorielli, 1986). Snyder and Blood (1992) found that advertisements increased perceived benefits and decreased perceived risks of the alcohol products shown. Associations of alcohol beverage advertising to alcohol consumption and attitudes regarding alcohol have been observed in nonexperimental studies (e.g., Grube & Wallack, 1994; Strickland, 1983), but the results from experimental studies attempting to link alcohol advertising to alcohol attitudes and consumption have been inconclusive (Smart, 1988; Sobell et al, 1986; Wilks, Vardanega, & Callan, 1992). The failure of many experiments to take prior drinking habits and gender into account when examining the effects of advertising on drinking behavior may be responsible for inconsistent findings (Wilks et al., 1992).

Summary
The purpose of this research is to study the effects of advertisements and warnings on measures of perceived risks and benefits, memory, and intentions regarding alcohol use, and to replicate the boomerang effect found in Snyder and Blood (1992). Two experiments were conducted,
both of which involved random assignment of participants to conditions varying in exposure to an alcohol advertisement and presence of the alcohol warning. Sex (male or female) and alcohol consumption (current drinker or not) were also included as factors as suggested by other researchers in this area (Wilks et al., 1992).

The lack of replication studies is claimed to be one of the reasons why the social sciences have not progressed as much as other fields (Ottenbacher, 1996). Ottenbacher concludes, “Exact replication is rare. Even rarer is replication with a more powerful design” (p. 274). Our first experiment was designed as a replication and extension of the Snyder and Blood (1992) study. In Experiment 2, we conduct a replication with a more powerful design.

**EXPERIMENT 1**

The primary goal of the first experiment was to examine the effects of advertisements and the Surgeon General’s warning on alcohol perceptions and drinking intentions, as a replication of Snyder and Blood (1992). A secondary goal was to explore the relationship of sex and drinking status on alcohol perceptions. A tertiary goal was to examine the effectiveness of an alternative warning, based on research suggesting that words such as poison and cancer elicit a greater avoidance response than the current alcohol warning label (MacKinnon, Nemeroff, & Nohre, 1994). The following hypotheses were tested in Experiment 1:

1. Advertisements will lead to more favorable perceptions of alcohol (e.g., more benefits, fewer risks).
2. Warnings will lead to less favorable perceptions of alcohol (e.g., fewer benefits, more risks).
3. A boomerang effect will be observed where perceived benefits and intent to use alcohol will increase among drinkers exposed to the warning.
4. Males and alcohol users will perceive more benefits and fewer risks relative to females and nonusers, respectively.
5. The warning based on avoidance responses will in general have stronger effects than the existing alcohol warning.

**Method**

**Participants.** One-hundred sixty-four undergraduates at Arizona State University participated in this study. The average age was 19.9 years ($SD = 3.1$; range = 17–39); 57% of the sample were female. In all, 67% of the participants were current drinkers. There was approximately equal representation of men and women drinkers: 64.5% of
the women and 70.4% of the men described themselves as current drinkers, $\chi^2(1) = 0.636, p > .10$.

**Materials.** Six sets of slides were used in the study, corresponding to level of advertisement (present or absent) and level of warning (none, Surgeon General’s, alternative). Actual alcohol advertisements were used for two brands of beer, two liquors, and two liqueurs. In the no-advertisement condition, the advertisement was electronically removed from the slide, leaving the alcohol product unchanged. In the two conditions that included exposure to the alcohol warning, the warning was placed near the bottom of the slide. The Surgeon General’s warning read as follows:

**GOVERNMENT WARNING:** (1) According to the Surgeon General, 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.

The alternative warning read as follows:

**GOVERNMENT WARNING:** According to the Surgeon General, the consumption of this product, which contains alcohol, causes serious health problems, is poisonous, and increases the risk of developing cancer.

Figure 1 shows one slide across the six conditions.

The questionnaire assessed demographic data (age, sex, drinking status), perceived benefits and risks of the alcohol products shown, and intentions to avoid alcohol in the future. Two final items asked whether they had noticed the presence of the warning label and, if so, what the content of the warning had been. Drinking status was assessed by a single question that read “Do you currently drink alcohol?.” Perceived benefits were measured with six questions completed for each of six slides, and perceived risks were measured with four questions completed for each of six slides. Intentions were measured with a single item. The questionnaire was designed from information provided in the Snyder and Blood (1992) article about the measures used in their study.

**Procedure.** Participants were run in groups of up to 20. All participants within a given session were exposed to the same experimental conditions defined by advertisement (present or absent) and warning (none, Surgeon General’s, or alternative). The nonmanipulated factors of sex and drinking status varied within each session. The order in which the slides were presented was randomly assigned for each session from two possible orders. This was a between-subjects design in which all participants in every condition were shown all six alcohol products.
At the start of each session, participants completed the first page of the questionnaire (demographics). The experimenter then began the slide presentation, leaving each slide on the screen for 15 seconds, and then advancing to a blank screen for 30 seconds, during which time the participants completed one page of the questionnaire (there was a separate page for each slide). This procedure continued for each of the six slides. The 10 items that were completed following each slide comprised the product benefits and risks scales. At the conclusion of the slide presentation, participants responded to the remainder of the questionnaire. In response to the question “Did you notice the presence of a warning label on the slides?,” 87% of participants exposed to a warning responded affirmatively, and 99% of those not exposed to the warning responded negatively.

**Measures.** Product benefits were measured by six items for each of the six products shown that assessed whether participants perceived the
Product as attractive, fashionable, pleasant tasting, exciting, fun, and sexy. Product risks were measured by four items for each of the six products shown that assessed whether the participants viewed the product as a serious health risk, harmful, safe, or risky. All items were responded to on 7-point semantic differential scales. The scale score for both the benefit and risk scales was computed as the mean of all items across all six slides. The product benefits construct was highly reliable (coefficient alpha [α] = 0.96), as was product risks (α = 0.97).

Intentions to avoid alcohol were measured by a single item, “I will not drink alcohol, or drink only occasionally, to avoid health problems.” It was responded to on a 7-point scale, with “very true” and “not true” marking the endpoints.

A single item that asked “Did you notice the presence of a warning on the slides?” was responded to by circling either yes or no; this item served as a manipulation check. Following Snyder and Blood (1992), memory for the Surgeon General’s warning was scored by coding the presence or absence of five key ideas (Surgeon General, pregnant women, drinking and driving, drinking and operating heavy machinery, and health problems) and then creating a summary index. Memory for the alternative label was similarly scored, the key ideas being Surgeon General, health problems, cancer, and poisonous. Recall of ideas similar to the key ideas were counted as correct recall, for example, for the pregnant women category, such comments as not drinking during pregnancy, birth defects, and harm to baby were counted.

Results
All data were analyzed by an ANOVA with four, fully crossed between-subjects factors: advertisement (present or absent), warning (none, Surgeon General, or alternative), drinking status (drinker or nondrinker), and sex. Dependent measures were scales of the alcohol products’ benefits and risks, intentions to avoid alcohol, and memory for the warning. Items were coded so that a higher number represented greater endorsement of the construct. Table 1 shows the means and standard errors for all of the dependent measures corresponding to main effects for each factor. The means reported incorporate the unequal sample sizes introduced by the nonrandomized factors of alcohol use and sex. The LSMEANS procedure in the SAS programming language (SAS Institute Inc., 1988) was used to obtain the means and standard errors. No adjustment for multiple comparisons was made for planned comparisons.

Product Benefits. Participants who viewed the alcohol products on neutral backgrounds perceived them as having fewer benefits than those who viewed the alcohol products in the context of advertisements, \( F(1,140) = 13.76, p < .001 \). Nondrinkers rated alcohol as less beneficial than did drinkers, \( F(1,140) = 28.86, p < .001 \). Both of these main effects
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</table>

*SG's refers to the Surgeon General’s warning.
Alt. refers to the alternative warning based on avoidance response.
were qualified by a three-way interaction between advertisement, drinking status, and sex, $F(1, 140) = 7.65, p < .01$. Among nondrinkers, the advertisement raised perceived benefits for females ($M = 2.42$ in the no-advertisement condition compared with $M = 4.07$ in the advertisement condition), $F(1, 140) = 21.64, p < .001$, whereas male nondrinkers were unaffected by the advertisement, $F(1, 140) = 0.07, p > .10$ ($M = 3.29$ in the no-advertisement condition and $M = 3.16$ in the advertisement condition). The advertisement led drinkers, both male ($M = 3.90$) and female ($M = 3.95$), to perceive greater product benefits relative to no advertisement (male $M = 4.66$ and female $M = 4.43$).

The warning by drinking status interaction was nonsignificant, $F(2, 139) = 1.67, p > .10$, suggesting that there was not a boomerang effect in this study. Despite the lack of a significant overall interaction, we computed the planned contrast of the warning effect for nondrinkers and drinkers separately. Nondrinkers not shown a warning ($M = 3.51$, $SE = 0.20$) perceived greater benefits than nondrinkers exposed to the Surgeon General’s warning ($M = 2.99$, $SE = 0.34$), though this difference was not significant, $F(1, 140) = 1.73, p > .10$; benefit perceptions of nondrinkers shown the alternative warning label were about midway between no warning and the Surgeon General’s warning ($M = 3.21$, $SE = 0.26$). For drinkers, exposure to the Surgeon General’s warning resulted in higher perceived benefits ($M = 4.45$, $SE = 0.18$) relative to no warning ($M = 4.13$, $SE = 0.15$), though this difference was also nonsignificant, $F(1, 140) = 1.86, p > .10$; benefit perceptions of drinkers shown the alternative warning were nearly identical to those of drinkers shown no warning ($M = 4.12$, $SE = 0.18$).

We conducted two additional analyses to test for the boomerang effect in order to more specifically replicate Snyder and Blood’s (1992) study. First, we excluded subjects in the alternative warning label condition that produced a marginally significant interaction between warning and drinking status, $F(1, 100) = 3.43, p = .07$. The results for drinkers were consistent with the boomerang hypothesis ($M = 4.13$ in the no-warning condition and $M = 4.45$ in the warning condition; $SE = 0.15$ and 0.18, respectively), though this difference was not significant, $F(1, 100) = 1.91, p > .10$. Second, we again excluded subjects in the alternative warning condition, and also omitted all subjects older than 22, as was done by Snyder and Blood. A significant interaction between warning and drinking status, $F(1, 89) = 4.44, p < .05$, was now present. The contrast for drinkers showed a marginally significant increase in benefit perceptions in the warning condition ($M = 4.64$, $SE = 0.18$) compared to the no warning condition ($M = 4.20$, $SE = 0.15$), $F(1, 89) = 3.48, p < .10$.

**Product Risk.** Nondrinkers perceived greater risks associated with alcohol than did drinkers, $F(1, 140) = 26.06, p < .001$. Neither the warning
nor the advertisement had a significant effect on perceptions of product risks.

**Intentions to Avoid Alcohol.** Nondrinkers were significantly more likely to agree that they would avoid alcohol in the future in order to avoid health problems than were drinkers, $F(1,140) = 71.97, p < .001$. Neither warning nor advertisement had a significant effect on intentions.

The hypothesized boomerang effect was not observed. In the overall analysis, the interaction of warning by drinking status was very close to zero, $F(2,140) = 0.09, p > .10$, as were all planned contrasts, and the results were unchanged when the two additional analyses that allowed for a more direct comparison with Snyder and Blood (1992) were conducted (i.e., dropping the alternative warning and deleting participants older than 22 from the analysis).

**Memory.** There was a main effect of warning on memory for the Surgeon General’s warning, $F(2,140) = 30.24, p < .001$. Participants shown the Surgeon General’s warning had significantly better recall of the warning’s content than participants shown the alternative warning, $F(1,140) = 7.83, p < .01$, or no warning, $F(1,140) = 53.82, p < .001$. There was also a main effect of warning on memory for the alternative warning, $F(2,140) = 36.01, p < .001$. Those shown the alternative warning had significantly better recall of that warning’s content than those shown either the Surgeon General’s warning, $F(1,140) = 17.08, p < .001$, or no warning, $F(1,140) = 72.01, p < .001$.

**Discussion**

Exposure to advertisements led to greater perceived product benefits and less perceived risk suggested by the slides. An interaction between advertisement, drinking status, and sex showed that the positive effect of advertisements on benefit perceptions was true for all participants except male nondrinkers. Exposure to the warning did result in more accurate memory for the warning’s content, but there was not evidence that the alternative warning had the strongest effects. Warnings appeared to have minimal impact on benefit and risk perceptions in the present study, as was also observed in the study by Snyder and Blood (1992). The presence or absence of the advertisement did not have any effect on memory for the warning, thus failing to support the notion that advertisements distract from warning communications. As predicted, drinkers perceived the products as having more benefits and fewer risks and reported lower intentions to avoid alcohol relative to nondrinkers. These findings provide evidence that the subject variables of drinking
status and sex are important factors in studies of alcohol attitudes and behavior, as has been suggested (Wilks et al., 1992).

There was no convincing evidence for the boomerang effect. In a planned comparison to examine the effect of the warning on benefits, the interaction of warning and drinking status was significant only when the alternative warning and persons older than 22 were deleted. Snyder and Blood (1992) reported that the nondrinkers perceived less product benefits when exposed to the warning, but that this was not a significant difference. They did report a significant difference such that drinkers perceived more product benefits when exposed to the warning. In the present experiment, both of these trends were present but neither was significant. There was no evidence of a boomerang effect on intentions.

There are psychological theories that predict the boomerang effect observed by Snyder and Blood (1992). Reactance, for example, suggests that if a warning is viewed as an infringement on people’s right to choose for themselves, they may react in a manner opposite to the persuader’s intention (Brehm, 1966). If drinkers experience reactance to the alcohol warning label, they may report higher benefits after exposure to the warning. The other explanation of the boomerang effect is more cognitive. The exposure to the warning may cause an inconsistency between the drinker’s behavior, alcohol consumption, and the warning against such behavior. Alcohol users reconcile the uneasiness created by attributing more benefits to alcohol consumption. This inconsistency is referred to as cognitive dissonance (Festinger, 1957).

Both the reactance and dissonance explanations of the boomerang effect would predict that the effect should increase as the subject’s level of alcohol use increases. If the alcohol warning is indeed counterproductive, the effect would be more convincing if it increased with greater alcohol use. We conducted an additional analysis for the boomerang effect with an alcohol-use measure that included an additional category to distinguish light–moderate drinkers from heavy drinkers. The boomerang interaction was close to zero for all tests when this variable was included in the analysis.

EXPERIMENT 2

An interaction of warning and drinking status on perceived benefits of the alcohol product found in Snyder and Blood (1992) was replicated in one of the analyses for Experiment 1, but analysis of the simple effects to examine the interpretation that the warning caused drinkers’ perceptions of benefits to boomerang was inconclusive. In Experiment 2, overall sample size was increased and the condition with the alternative alcohol warning based on avoidance responses was not included. Based
on the effect size for the boomerang effect in Experiment 1, the sample size for Experiment 2 was selected to have greater than 0.9 probability to detect a boomerang effect as large or larger than the effect observed in Experiment 1.

Hypotheses 1–4 that were set forth in Experiment 1 were again tested in Experiment 2. All dependent measures from Experiment 1 and one additional measure of drinking benefits were included in Experiment 2. Perceived benefits of drinking was added because the only benefits scale included in Experiment 1 and in Snyder and Blood (1992) was benefits of the alcohol products shown, rather than perceived benefits of alcohol use. Benefits of drinking alcohol in general may be more relevant to the question of whether warnings are counterproductive than a measure of benefits of a specific product.

Method

Participants. There were 268 participants in the second experiment. The average age was 19.9 years (SD = 4.1; range = 17–47); 70.9% of the sample were female. In all, 71.9% of the participants were current drinkers. There was no difference in drinking status as a function of sex: 73.2% of the women and 69.2% of the men were current drinkers, $\chi^2(1) = 0.423, p > .10$.

Materials. Four sets of slides were used in this experiment, corresponding to level of advertisement (present or absent) and level of warning (Surgeon General’s or none). These were the same slides used in the first experiment (see Figure 1), minus the two sets containing the alternative warning label. The questionnaire used in Experiment 1 was expanded for Experiment 2 to include the additional dependent measure.

Procedure. The procedure followed that of Experiment 1. The manipulated factors were advertisement (present or absent) and warning (present or absent). During the slide presentation, 1 minute elapsed between each slide shown. This allowed for the completion of the additional items measuring perceived benefits of drinking. Ninety-four percent correctly remembered seeing the warning if they were exposed to it, and 94% correctly reported that no label was present if they were not exposed to it.

1We also measured social risks, personal risk, and risk suggested by the slides, but we do not describe these results to conserve space. Results for these measures did not add substantially to the results described in this report.

2Experiment 2 also included a manipulation designed to produce reactance. The reactance manipulation was not successful. To conserve space the reactance manipulation is not described in this report.

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Measures. As in Experiment 1, all items were responded to on 7-point scales. Product benefits and risks were comprised of the same items as in Experiment 1. Drinking benefits was assessed by five items (relaxing, dangerous, enjoyable, disinhibiting, healthy). As in Experiment 1, the scale score was computed as the mean of all items for that construct across the six slides. The constructs were reliable (product benefits $\alpha = 0.95$; product risks $\alpha = 0.95$; and drinking benefits $\alpha = 0.75$). Intent to avoid alcohol was measured with a single item, as in Experiment 1. Memory for the Surgeon General’s warning was scored as in Experiment 1.

Results

All data were analyzed in an ANOVA with four factors: advertisement (present or absent), warning (Surgeon General’s or none), drinking status (drinker or nondrinker), and sex. Dependent measures included scales of the alcohol products’ benefits and risks, intentions to stop drinking, recall memory, and benefits of drinking. Items were coded so that a higher number represented greater endorsement of the construct. The means and standard errors for all of the dependent measures are shown in Table 2.

Product Benefits. Viewing the alcohol products in the absence of the advertisements led to lower perceptions of product benefits than viewing the alcohol products within the context of an advertisement, $F(1,252) = 12.66, p < .001$. Nondrinkers rated the products as having fewer benefits than did drinkers, $F(1,252) = 34.13, p < .001$. The drinking status by warning interaction was negligible, $F(1,252) = 0.09, p > .10$, suggesting no boomerang effect. Analysis of the simple effects confirmed the lack of a boomerang effect. There was no significant difference between nondrinkers exposed to the warning ($M = 3.02, SE = .17$) and nondrinkers not shown the warning ($M = 3.24, SE = 0.24$), $F(1,252) = 0.54, p > .10$. Drinkers exposed to the warning had lower perceived benefits ($M = 3.95, SE = 0.12$) than drinkers not shown the warning ($M = 4.27, SE = .12$), $F(1,252) = 3.38, p < .10$, though this was only marginally significant and opposite to the boomerang effect.

As in Experiment 1, we repeated the analysis on product benefits, limiting the analyses to participants aged 22 and younger. There was no evidence of the boomerang effect, $F(1,222) = 0.11, p > .10$. The planned contrasts revealed a nonsignificant decrease in nondrinkers’ benefit perceptions in the warning condition ($M = 3.03, SE = 0.17$) compared with the no warning condition ($M = 3.42, SE = .31$), $F(1,222) = 1.21, p > .10$, and in drinkers’ benefit perceptions in the warning condition ($M = 3.99, SE = 0.13$) compared with the no-warning condition ($M = 4.25, SE = 0.12$), $F(1,222) = 2.08, p > .10$. 

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Table 2. Means and Standard Errors for the Dependent Measures in Experiment 2

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</tr>
<tr>
<td>M</td>
<td>0.04</td>
<td>2.01</td>
<td>1.14</td>
<td>0.91</td>
</tr>
<tr>
<td>SE</td>
<td>0.11</td>
<td>0.08</td>
<td>0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>Drinking benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.92</td>
<td>3.75</td>
<td>3.67</td>
<td>4.00</td>
</tr>
<tr>
<td>SE</td>
<td>0.10</td>
<td>0.08</td>
<td>0.08</td>
<td>0.10</td>
</tr>
</tbody>
</table>

<sup>a</sup>SG's refers to the Surgeon General's warning.
**Product Risks.** On perceived product risks, there were main effects for all four of the factors. Those in the no-warning condition had lower risk perceptions than those exposed to the alcohol warning, $F(1,252) = 4.68, p < .05$; the absence of the advertisements resulted in higher perceived risk compared to the presence of the advertisements, $F(1,252) = 4.64, p < .05$; nondrinkers perceived greater risk than drinkers, $F(1,252) = 21.04, p < .001$; and women perceived greater product risk than did men, $F(1,252) = 8.07, p < .01$.

Advertisement, drinking status, and sex contributed to a three-way interaction, $F(1,252) = 6.57, p < .05$. Among nondrinkers the difference between males and females was greatest for the advertisement condition (males $M = 3.68$ and females $M = 4.97$) compared to the no-advertisement condition (males $M = 4.92$ and females $M = 5.12$). Among drinkers the differences between males and females was greater in the no-advertisement condition (males $M = 3.50$ and females $M = 4.24$) compared to the advertisement condition (males $M = 3.81$ and females $M = 3.71$).

**Intentions To Avoid Alcohol.** Not surprisingly, nondrinkers had higher intentions of avoiding alcohol consumption than did drinkers, $F(1,251) = 88.15, p < .001$. Overall, women had stronger intentions to avoid alcohol than did men, $F(1,251) = 13.43, p < .001$.

Warning and sex combined for a significant two-way interaction, $F(1,251) = 6.18, p < .05$. The difference between female’s intention to avoid alcohol in the no-warning ($M = 5.17$) and the warning conditions ($M = 4.78$) was opposite to the difference between the no-warning ($M = 3.34$) and warning ($M = 4.43$) conditions for males, but neither of these simple effects were statistically significant.

The warning by drinking status interaction was nonsignificant, $F(1,251) = 1.02, p > .10$, again not supporting a boomerang effect of the warning on drinkers. Analysis of the specific effects on nondrinkers and drinkers showed that there was virtually no difference in intentions to avoid alcohol as a function of warning exposure. Nondrinkers’ intentions to avoid alcohol in the no-warning condition ($M = 5.51, SE = 0.42$) did not reliably differ from nondrinkers’ intentions to avoid alcohol in the warning condition ($M = 6.16, SE = 0.29$), $F(1,251) = 1.60, p > .10$. Similarly, drinkers’ intentions to avoid alcohol in the no-warning condition ($M = 3.01, SE = .21$) did not differ from drinkers’ intentions to avoid alcohol in the presence of the warning ($M = 3.05, SE = 0.22$), $F(1,251) = 0.02, p > .10$. The planned comparison that involved dropping participants older than 22 was also nonsignificant, $F(1,221) = 2.75, p = .10$.

**Memory.** Exposure to the warning produced better recall for the warning’s content than no exposure, $F(1,252) = 208.05, p < .001$. There were no other significant effects on memory.
Benefits of Drinking Alcohol. The advertisements led to greater perceived benefits of drinking compared to the absence of the advertisements, $F(1,252) = 7.12, p < .01$. Nondrinkers perceived fewer benefits of drinking than was perceived by drinkers, $F(1,252) = 38.30, p < .001$.

There was a significant warning by advertisement interaction, $F(1,252) = 4.36, p < .05$. In the absence of the warning, the advertisements significantly increased benefit perceptions ($M = 4.22, SE = 0.16$) relative to no advertisements ($M = 3.61, SE = 0.12$), $F(1,252) = 9.10, p < .05$, but in the presence of the warning, the advertisement did not significantly affect benefit perceptions ($M = 3.79, SE = 0.10$ in the advertisement condition and $M = 3.72, SE = 0.12$ in the no-advertisement condition), $F(1,252) = 0.22, p > .10$.

There was also a three-way interaction between advertisement, drinking status, and sex, $F(1,252) = 4.87, p < .05$. Among nondrinkers, women’s perceptions of drinking benefits were not affected by the absence ($M = 3.42$) or presence ($M = 3.31$) of the advertisement, $F(1,252) = 0.17, p < .10$, but nondrinking men had lower benefit ratings in the no-advertisement condition ($M = 3.08$) than in the advertisement condition ($M = 3.95$), $F(1,252) = 5.25, p > .10$, though this difference was also not significant. Drinkers, both male and female, perceived drinking to be less beneficial in the absence of the advertisement (females $M = 3.92$; males $M = 4.25$) as compared with the presence of the advertisements (females $M = 4.29$; males $M = 4.45$).

Discussion

From the results of Experiment 1 it was unclear whether the Snyder and Blood (1992) finding of a boomerang effect on product benefits was replicable. Experiment 2 was improved to have sufficient power to detect this effect. The boomerang effect was not observed on either the benefits or intentions dependent measures and was very close to zero. The warnings produced lower benefit ratings for all subjects, regardless of drinking status, suggesting that the alcohol warning is not counterproductive.

As in the first experiment, advertisements and drinking status were important predictors of benefit and risk perceptions and intentions to use alcohol. In general, advertisements increased perceived benefits and decreased risks. Being a drinker was related to higher benefit and lower risk perceptions. Sex also was related to several of the dependent measures, with women associating drinking with more risks relative to men and women having greater intentions to avoid alcohol in the future.

Exposure to the warning led to higher perceptions of product risk and more accurate memory for the warning. The presence of the warning counteracted the effect of the advertisement on increasing perceived benefits of drinking.
The purpose of this research was to study the effects of warnings and advertisements. There was evidence in both studies that advertisements increased perceived benefits and decreased perceived risks of the alcohol product. In Experiment 2, there was also evidence that warnings led to increased perceived risks and reduced effects of advertisements on perceived benefits.

We were particularly interested in examining the extent to which the presence of warnings was counterproductive for drinkers—the boomerang effect. There was some evidence for the boomerang effect in Experiment 1, although only with an interaction contrast, and the specific test of the boomerang hypothesis—wherein drinkers perceive increased benefit in the presence of a warning—was not statistically significant. Furthermore, the interaction contrast was nonsignificant when alcohol use was divided into three categories of no use, some use, and heavy use. If alcohol users perceive more benefits when exposed to a warning, then the perception of benefits should be greatest for the heaviest alcohol users. Experiment 2 was designed to have increased power to detect the boomerang effect, but the effect was not observed. There was no evidence for the boomerang effect Snyder and Blood (1992) obtained on intentions for male drinkers in either experiment.

Overall the results of these two experiments do not support the existence of a boomerang effect. It is possible that future studies might find such effects, but it is critical in future studies that the specific contrast to test this effect be conducted and that the extent to which the boomerang effect increases with increasing levels of alcohol use be examined. It will also be important to include sex as an independent variable in the analysis. Future research should examine receiver characteristics, such as religiosity and risk-taking, that may be responsible for any observed boomerang effect.

Another possibility was that advertisement effects would block warning effects. Snyder and Blood (1992) found some support for this among nondrinkers for both product-benefit and product-risk perceptions. The experiments herein offer somewhat ambiguous results regarding the ability of advertisements to overwhelm warnings. In Experiment 1, as in Snyder and Blood's study, there was not a significant effect of warnings. In Experiment 2, participants in the advertisement plus warning condition perceived lower product benefits than participants in the advertisement-only condition, suggesting that advertisements do not overwhelm warning effects.

Critics of warning labels have suggested that warnings are not noticed. In both experiments, increased memory for the content of the warning was found among subjects exposed to warnings. If warnings are not noticed, then these warnings should not have been remembered.
at all. These results are consistent with those found by others (Barlow & Wogalter, 1993; MacKinnon & Fenaughty, 1993; Smith, 1990).

There are, of course, several difficulties in extending laboratory studies such as this one to the natural settings where warnings or advertisements may have effects. First, exposures to the warning and advertisements are likely to be repeated many times rather than presented on each of six product slides as in the experiments reported here. Second, study participants have already had sufficient exposure to alcohol to establish attitudes regarding its use. Third, the alcohol warning has been required on alcohol containers since 1989, which makes it likely that participants in the studies herein and in the Snyder and Blood (1992) study were already familiar with the alcohol warning label. Finally, measures such as perceived benefits and perceived risks are important inasmuch as they are causally related to the negative outcomes listed on the warning, such as health problems and traffic crashes.

REFERENCES

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