The Association between Adolescents’ Receiver Characteristics and Exposure to the Alcohol Warning Label*

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ABSTRACT

The association between receiver characteristics and awareness of, exposure to, memory for, and beliefs about the alcohol warning label were examined. The receiver characteristics studied were sex, socioeconomic status, ethnicity, school grades, religious service attendance, alcohol use, friends' alcohol use, drinking from the alcohol container, and television viewing. Independent cross-sectional samples of 12th-grade students (n = 6,391) completed a questionnaire before and after the federally mandated warning appeared on alcohol beverage containers. Many of the receiver characteristics were significantly associated with the warning measures. There was not much evidence indicating that receiver characteristics moderated the association between the appearance of the warning and warning awareness, exposure, memory, or beliefs. © 1999 John Wiley & Sons, Inc.

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The notion that individual differences may affect the reception and effectiveness of a communication has often been proposed. These individual differences, called receiver characteristics, are important because the success of a communication may depend on the sender's ability to accurately identify the characteristics, cognitive abilities, and interests of the intended audience (Ayres et al., 1989; Laughery & Brelsford, 1991; McGuire, 1980). Successful messages intended for the general population are especially difficult to create because of the diverse audience (Driver, 1987). The warning on alcohol beverage containers is the message examined in this study. Receiver characteristics such as demographics, familiarity and experience with the product, competence, and hazard or risk perception (Laughery & Brelsford, 1991) may predict differential response to the alcohol warning label across subgroups of the population. If subsets of the population do not receive the risk information conveyed on alcohol containers, then modification of the warning or implementation of other prevention strategies may be necessary to disseminate this information to these subgroups.

Studies of adolescents, adults, and pregnant women have indicated that people see the alcohol warning label, are aware of the labeling law, and remember the risks on the warning. There is limited evidence indicating that alcohol-related risk perceptions or behaviors have changed since the inclusion of the warning on alcohol containers (for reviews see Andrews, 1995; MacKinnon, 1995). The importance of receiver characteristics in evaluating the alcohol warning was summarized by Andrews (1995) who stated, "Perhaps the most neglected area of alcohol warning label research is the examination of receiver effects" (p. 624). In this study, the association between 12th-grade students' receiver characteristics and awareness of the alcohol warning label law, exposure to the warning, memory for the risks on the warning, and beliefs about the risks on the warning label are evaluated. The receiver characteristics examined are demographics and product familiarity.

Demographics and Individual Differences
Prior research indicates that sex, socioeconomic status, ethnicity, academic competence, and religiosity may relate to the success of a warning. In general, females tend to look for, read, and comply with product warnings more than males (e.g., Godfrey, Allender, Laughery, & Smith, 1983; LaRue & Cohen, 1987; Laughery & Brelsford, 1991). On the other hand, males are more aware that there is an alcohol warning and recall the risks on the warning more accurately than females (e.g., Graves, 1993; Kaskutas & Greenfield, 1992, 1997). It has been suggested that being male is a proxy measure for increased alcohol involvement (e.g., Greenfield & Kaskutas, 1993), indicating that the higher exposure reported by males could be due to product familiarity rather than sex. Females may be more likely to see and remember the alcohol warning
label when controlling for alcohol use, as has been found for other product warnings. Females believe that alcohol is more harmful than males do (Mazis, Morris, & Swasy, 1991); consequently females may believe the risks on the warning more than males.

There is some evidence that adults from lower socioeconomic status (SES) are more likely to believe that alcohol is harmful and more likely to think that alcoholic beverages have a warning but are less likely to accurately recall the birth defects risk than persons from higher SES (Mazis et al., 1991). In a study conducted after the warning was required, Marén (1991) found differences between non-Hispanic Whites’ and Hispanics’ awareness of the warning, but the differences were inconsistent across different types of alcoholic beverages. Other studies have not found significant differences between African Americans, Hispanics, and Whites (Kaskutas & Greenfield, 1997; Mazis, Morris, & Swasy, 1996).

The readability of the alcohol warning label is at a level typically required of college students (Malouff, Gabrilowitz, & Schutte, 1992), suggesting that an individual’s level of education may be associated with variables measuring the alcohol warning label. The present 12th-grade sample is homogeneous with regard to education, but reading ability varies. The student’s typical school grades are used as a proxy measure of academic competence, even though high school grades reflect more than reading ability or intelligence (i.e., interest or motivation).

Adolescents who regularly attend religious services tend to drink less alcohol and believe that drinking alcohol is a less appropriate behavior than those who do not attend services as frequently (Bloch, Crockett, & Vicary, 1991; Francis & Mullen, 1993). Devout Mormons, given their religious proscriptions against alcohol use and Utah’s alcohol control policy, are less likely to see the alcohol warning label than non-Mormons (Mayer, Smith, & Scammon, 1991).

Product Familiarity

People who are familiar with a product are less likely to look for, be aware of, read, or comply with a warning on that product (e.g., Godfrey et al., 1983; Goldhaber & deTurck, 1988a, 1988b). In contrast to the findings for other product warnings, research on the alcohol warning indicates that heavier alcohol users are more aware of the warning, have seen the alcohol warning, and have more accurate memory for the risks on the alcohol warning than light-users or nonusers (e.g., Hankin et al., 1996; Greenfield & Kaskutas, 1993; MacKinnon & Fenaughty, 1993; Parsons, Johnson, & Barrett, 1994). Heavier alcohol users are less likely to believe or comply with the alcohol warning relative to light-users (Hankin et al., 1993; Patterson, Hunnicutt, & Stutts, 1992).

Although prior research has focused on alcohol use, there are reasons to propose that additional indicators of familiarity could be related to...
measures of the alcohol warning label. Even nondrinkers could see the alcohol warning if they are around friends who drink alcohol. The number of alcohol drinkers one knows may be associated with norms about drinking and hazard perception. Drinking alcohol from the container (i.e., the can or bottle) can result in multiple exposures to the warning during the consumption of a single drink because the warning is on the container. People who open alcohol containers are more likely to see the warning (Kaskutas & Greenfield, 1997). Accordingly, consuming alcohol from the container may be associated with increased exposure to the alcohol warning relative to drinkers who tend to pour the product into a glass. Television viewing may be associated with more exposure to the warning due to the media coverage surrounding the warning on alcohol beverage containers. Alcohol is positively portrayed in television programming and advertising, which may increase adolescents' beliefs in the positive consequences of alcohol use.

The Present Study

Although high school seniors cannot buy alcohol legally, their knowledge of the alcohol warning is important because the formation of alcohol-related attitudes and experimentation with alcohol often occur during the teenage years (Newcomb & Bentler, 1988). The warning is relevant to high school seniors as the majority (80–90%) have tried alcohol (Johnson, O'Malley, & Bachman, 1996) and students may drive after drinking, get pregnant, operate machinery, or have health problems (e.g., alcohol poisoning) as a result of alcohol.

The purpose of this study is to address two questions. The first question is which adolescent receiver characteristics are related (main effect) to awareness of, exposure to, memory for, and beliefs about the alcohol warning label. On the basis of the preceding discussion, the following predictions are proposed. Lower SES, higher usual school grades, infrequent religious service attendance, heavier alcohol use, and drinking from the can or bottle will be associated with more awareness of the alcohol warning label law. Females, higher usual grades, less religious service attendance, heavier alcohol use, and drinking from the can or bottle will be associated with exposure to the alcohol warning. Females, higher SES, higher usual grades, less religious service attendance, more alcohol use, and drinking from the can or bottle will be associated with more accurate memory for the risks listed on the warning label. Females, lower SES, higher usual grades, more religious service attendance, less alcohol use, fewer friends who drink, and less television viewing will be associated with believing the risks on the alcohol warning label.

The second question is which receiver characteristics moderate (in-
teract with) the association between the appearance of the warning and awareness, exposure, memory, and beliefs. Heavier alcohol use, more friends who use alcohol, and drinking from the alcohol container are expected to be associated with larger increases pre- to postwarning in awareness, exposure, and memory for the alcohol warning. These same students are expected to be less influenced, as measured by beliefs, by the warning's message.

METHOD

Participants
The participants were 6,391 12th-grade students in schools randomly selected to reflect the composition of high-school students in Marion County, Indiana. During the fall of 1989, prior to appearance of the alcohol warning label, 1,211 students were surveyed. After the warning appeared, 2,006 and 3,174 students were surveyed during the 1990/1991 and 1991/1992 school years, respectively. The data from the two postwarning years were combined into one postwarning sample to simplify the analyses and results.

Design
The alcohol warning was mandated to appear on alcoholic beverage containers produced for the United States by November 18, 1989 (Alcohol Beverage Labeling Act, 1988) which precluded randomization of warning exposure. Awareness of, exposure to, memory for, and beliefs about the warning were evaluated by examining these measures before and after the warning appeared. The alcohol warning label is an example of a treatment that diffuses through the population over time. Students in the prewarning sample who indicate that they saw the alcohol warning may have seen it as some alcohol containers displaying the warning were sold prior to the mandated deadline and from media attention. Reported exposure to the alcohol warning label in the pre- and postwarning measurements should be viewed as a combination of real exposure and false positives. The proportion of false positives is assumed to be similar before and after the warning appeared. Students could have been aware of the labeling law in the prewarning measurement because the law was enacted in 1988. Memory for the warning adjusts for false positives with two distractor risks.

The variables for this study were included on a questionnaire administered yearly to monitor drug use and assess a drug-prevention program. The students in the present study had not participated in the
Table 1. The Means of Awareness, Exposure, Memory, and Beliefs before and after the Appearance of the Alcohol Warning Label by Each Receiver Characteristic

<table>
<thead>
<tr>
<th>Receiver Characteristic</th>
<th>Awareness</th>
<th>Exposure</th>
<th>Memory</th>
<th>Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Overall</td>
<td>2.44</td>
<td>3.27</td>
<td>2.44</td>
<td>2.96</td>
</tr>
<tr>
<td>Sex</td>
<td>2.60</td>
<td>3.29</td>
<td>2.55</td>
<td>2.96</td>
</tr>
<tr>
<td>Female</td>
<td>2.29</td>
<td>3.24</td>
<td>2.34</td>
<td>2.97</td>
</tr>
<tr>
<td>Male</td>
<td>2.40</td>
<td>3.28</td>
<td>2.40</td>
<td>2.88</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>2.56</td>
<td>3.28</td>
<td>2.57</td>
<td>2.93</td>
</tr>
<tr>
<td>White</td>
<td>2.38</td>
<td>3.22</td>
<td>2.27</td>
<td>2.91</td>
</tr>
<tr>
<td>Other</td>
<td>2.49</td>
<td>3.31</td>
<td>2.60</td>
<td>3.01</td>
</tr>
<tr>
<td>SES</td>
<td>2.36</td>
<td>3.24</td>
<td>2.31</td>
<td>2.86</td>
</tr>
<tr>
<td>Above avg.</td>
<td>2.50</td>
<td>3.30</td>
<td>2.56</td>
<td>3.05</td>
</tr>
<tr>
<td>Below avg.</td>
<td>2.34</td>
<td>3.28</td>
<td>2.39</td>
<td>3.00</td>
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<tr>
<td>Religious service attendance</td>
<td>2.38</td>
<td>3.22</td>
<td>2.27</td>
<td>2.91</td>
</tr>
<tr>
<td>Never</td>
<td>2.51</td>
<td>3.31</td>
<td>2.48</td>
<td>3.04</td>
</tr>
<tr>
<td>Rarely</td>
<td>2.61</td>
<td>3.38</td>
<td>2.66</td>
<td>3.02</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2.33</td>
<td>3.23</td>
<td>2.30</td>
<td>2.85</td>
</tr>
<tr>
<td>Religious service attendance</td>
<td>2.42</td>
<td>3.14</td>
<td>2.42</td>
<td>2.78</td>
</tr>
<tr>
<td>TV (hours/day)</td>
<td>2.35</td>
<td>3.28</td>
<td>2.28</td>
<td>2.98</td>
</tr>
<tr>
<td>Alcohol (drinks last month)</td>
<td>2.38</td>
<td>3.30</td>
<td>2.48</td>
<td>3.03</td>
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<td>1–10</td>
<td>2.55</td>
<td>3.28</td>
<td>2.54</td>
<td>2.93</td>
</tr>
<tr>
<td>11–20</td>
<td>2.55</td>
<td>3.28</td>
<td>2.56</td>
<td>2.99</td>
</tr>
<tr>
<td>21 or more</td>
<td>2.33</td>
<td>3.46</td>
<td>2.55</td>
<td>3.30</td>
</tr>
<tr>
<td>Number of friends that drink</td>
<td>2.36</td>
<td>3.19</td>
<td>2.18</td>
<td>2.66</td>
</tr>
<tr>
<td>Never</td>
<td>2.54</td>
<td>3.23</td>
<td>2.38</td>
<td>2.87</td>
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<tr>
<td>1–10</td>
<td>2.45</td>
<td>3.23</td>
<td>2.47</td>
<td>2.93</td>
</tr>
<tr>
<td>11–20</td>
<td>2.45</td>
<td>3.22</td>
<td>2.56</td>
<td>2.90</td>
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<tr>
<td>21 or more</td>
<td>2.43</td>
<td>3.28</td>
<td>2.41</td>
<td>3.07</td>
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<tr>
<td>Drink from container</td>
<td>2.46</td>
<td>3.21</td>
<td>2.43</td>
<td>2.79</td>
</tr>
<tr>
<td>Never</td>
<td>2.35</td>
<td>3.31</td>
<td>2.38</td>
<td>3.06</td>
</tr>
<tr>
<td>Hardly ever</td>
<td>2.43</td>
<td>3.29</td>
<td>2.47</td>
<td>3.11</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2.35</td>
<td>3.31</td>
<td>2.38</td>
<td>3.06</td>
</tr>
</tbody>
</table>

*aSignificant main effect.

A significant interaction between the receiver characteristic and the appearance of the warning.
drug-prevention program. The subjects were obtained from two sampling plans, one cross-sectional and the other longitudinal. In the cross-sectional sampling plan, classrooms of 12th-grade students were randomly selected from each school in Marion County and surveyed during school hours. The samples were selected to be representative of students in the county (MacKinnon, Pentz, & Stacy, 1993). During the 1991/1992 school year, 1,777 students from a concurrent longitudinal survey that began in 1987 were in 12th grade. These 12th-grade students were combined with the cross-sectional sample for the analyses in this report. The cross-sectional and longitudinal study questions were identical.

Measures

Because of the large number of survey items, several forms of the questionnaire were randomly assigned to respondents. The items used as outcome measures, awareness of the alcohol warning law, exposure to the warning, recognition memory for, and beliefs about the risks on the warning are presented in the Appendix. These measures were separated by questions on other topics. The awareness, exposure, and beliefs measures had four response categories: "yes, definitely," "probably," "I don't think so," and "no." There were four beliefs items, which measured whether students thought that alcohol could cause each of the risks listed on the warning (average Cronbach's $\alpha = 0.80$). The beliefs composite was the average of the four beliefs items. The recognition memory measure consisted of the sum of correct responses (yes or no) to six risks, the four risks on the warning and two distractor risks.

The receiver characteristics studied were sex, SES, ethnicity, usual school grades, religious service attendance, alcohol use in the last month, number of friends who drink alcohol, frequency of drinking from the alcohol container, and hours of television watched on an average weekday. The categories for each of the receiver characteristics can be seen in the left column of Table 1. SES was measured by the students' self-report of four variables corresponding to their two parents' occupation and education. The items were standardized and the mean of the four variables was computed. If one, or more, SES variable was missing (e.g., mother's occupation) the mean of the remaining variables was used as the measure of SES. The occupation items were open-ended and coded into scales ranging from 1–9 based on high- to low-paying employment (e.g., managerial, service, technical). SES was split at the sample's mean to define the categories above and below average. Ethnicity was dichotomized into White and other ethnicities because of the small percentage of students in other ethnic categories. The majority of students in the other ethnicities category were African American (92%).
Four linear regression models predicted exposure to, awareness of, beliefs about, and memory for the risks on the warning. Each model estimated the main effects of warning appearance (before versus after) and each receiver characteristic. Four additional models included the main effects and the interactions between each receiver characteristic and the year of measure. The variables were centered prior to creating the interactions following procedures outlined in Aiken and West (1991). The main effects from the model without the interactions are presented. The interaction effects presented are from the model including the main effects and the interactions. Unstandardized betas and partial correlations are presented.

RESULTS

Sample Characteristics

The sample was 51% male, 74% white, 47% from high SES; 47% had higher than "C" school grades; 60% attended church at least sometimes. Compared with National Census data (1990), the sample had slightly fewer White students, slightly more African American students, and slightly more males. Eighty percent of the students had more than one alcohol drink in their lifetime, and 52% had at least one drink in the last month. Eighty-nine percent of the students had at least one friend who drank alcohol, 54% reported drinking from the alcohol container sometimes, and 42% watched at least three hours of television per day.

Model Fit and Overall Warning Label Results

The outcome measures weresignificantly correlated with each other for the data with all school years combined. Awareness was correlated with exposure \( r = 0.46, p < .0001 \), memory \( r = 0.39, p < .0001 \), and beliefs \( r = 0.07, p < .0001 \); exposure was correlated with memory \( r = 0.31, p < .0001 \), and beliefs \( r = 0.05, p < .0001 \); memory was correlated with beliefs \( r = 0.10, p < .0001 \).

Four multiple regressions were conducted, one for each of the outcome measures (awareness, exposure, memory, and beliefs). Receiver char-

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1The same models were estimated with ordinal logistic regression to determine whether relaxing the assumption of interval scaling for the outcome measure led to different results. The results of the logistic regression were consistent with the ordinary regression results. The students were sampled in school clusters, which can produce intraclass, or within-school, correlations. Typical regression analysis ignores the intraclass correlations and the standard error inflation that can be caused by this clustering. An additional analysis bootstrapped the standard errors to adjust for the intracllase correlations with the use of the statistical program AMOS (Arbuckle, 1997). The bootstrapped standard errors were only slightly inflated and produced the same pattern of results.
characteristics and the year of measure were significantly associated with awareness of the alcohol warning ($R^2 = 0.128, F(10, 5986) = 87.42, p < .0001$), exposure to the alcohol warning ($R^2 = 0.061, F(10, 5985) = 38.94, p < .0001$), recognition memory for the risks on the label ($R^2 = 0.105, F(10, 4790) = 56.00, p < .0001$), and beliefs about the risks listed on the label ($R^2 = 0.029, F(10, 4749) = 14.07, p < .0001$). Adding the interactions significantly increased the amount of accounted-for variance in awareness ($R^2_{\text{int}} = 0.004, F(9, 5966) = 3.20, p < .001$), exposure ($R^2_{\text{int}} = 0.005, F(9, 5965) = 3.55, p < .001$), and memory ($R^2_{\text{int}} = 0.009, F(9, 4770) = 5.50, p < .001$) but not in beliefs ($R^2_{\text{int}} = 0.003, F(9, 4729) = 0.17, p > .05$).

Table 1 shows the unadjusted means for each outcome measure before and after the appearance of the warning label under the heading overall. The students were significantly more aware of the alcohol warning label law, had more exposure to the warning, and had better memory for the risks on the warning ($b = 0.412, SE = 0.015, r^2 = 0.116, p < .0001$), had more exposure to the warning ($b = 0.258, SE = 0.019, r^2 = 0.091, p < .0001$), and had better memory for the risks on the warning ($b = 0.421, SE = 0.021, r^2 = 0.081, p < .0001$) after the warning appeared on alcohol containers. Students’ beliefs about the risks on the warning were unaffected by the appearance of the warning ($b = 0.001, SE = 0.005, r^2 = 0.000, p > .10$); however, approximately 90% of the students stated that they definitely believed the risks in the prewarning measurement.

### Demographics and Individual Characteristics

The following results are organized by the receiver characteristic categories rather than by outcome measures. Main effects ($\beta_M$) and interaction effects ($\beta_I$) are presented for each significant receiver characteristic. Table 1 shows the unadjusted means of each outcome measure before and after the warning appeared by each receiver characteristic. Although it appears that females were more aware of the alcohol warning labeling law ($b = 0.412, SE = 0.015, r^2 = 0.116, p < .0001$), had more exposure to the warning ($b = 0.258, SE = 0.019, r^2 = 0.091, p < .0001$), and had better memory for the risks on the warning ($b = 0.421, SE = 0.021, r^2 = 0.081, p < .0001$) after the warning appeared on alcohol containers. Students’ beliefs about the risks on the warning were unaffected by the appearance of the warning ($b = 0.001, SE = 0.005, r^2 = 0.000, p > .10$); however, approximately 90% of the students stated that they definitely believed the risks in the prewarning measurement.

Non-White students were more aware of the warning law than White students ($b = 0.038, SE = 0.019, r^2 = 0.019, p < .05$). Overall, females recognized the risks on the warning more accurately ($b = 0.038, SE = 0.019, r^2 = 0.019, p < .05$). However, approximately 90% of the students stated that they definitely believed the risks in the prewarning measurement.
more accurate memory for the risks listed on the warning than non-White students ($\beta_w = 0.103, SE = 0.022, r^2_w = 0.004, p < .0001$) and White students’ memory increased more after the appearance of the label than non-White students’ memory ($\beta_w = 0.068, SE = 0.026, r^2_w = 0.001, p < .01$). White students believed the risks on the label more than non-White students ($\beta_w = 0.029, SE = 0.006, r^2_w = 0.006, p < .0001$); however, this difference was smaller after the warning appeared ($\beta_w = -0.017, SE = 0.007, r^2_w = 0.001, p < .05$).

Students from lower-SES families were more aware of the alcohol warning law than students from higher-SES families ($\beta_w = -0.048, SE = 0.012, r^2_w = 0.003, p < .0001$). Students from lower-SES families also responded that they had seen the warning more than students from higher-SES families ($\beta_w = -0.068, SE = 0.015, r^2_w = 0.003, p < .0001$), but exposure to the warning increased faster for students from higher-SES families, decreasing this difference ($\beta_w = 0.053, SE = 0.020, r^2_w = 0.001, p < .01$). SES was not associated with memory for the warning or beliefs about the risks on the warning.

Students with lower usual grades were more aware of the labeling law ($\beta_w = -0.029, SE = 0.012, r^2_w = 0.001, p < .05$) and had more exposure to the warning ($\beta_w = -0.080, SE = 0.016, r^2_w = 0.004, p < .0001$), but they believed the risks listed on the warning less ($\beta_w = 0.016, SE = 0.005, r^2_w = 0.002, p < .0001$) than students with higher usual grades in school. School grades were not associated with memory for the risks listed on the warning.

Religious service attendance was not significantly associated with awareness of, exposure to, or memory for the alcohol warning label. Students who frequently attended religious services believed the risks on the warning label more than students who attended religious services less frequently ($\beta_w = 0.011, SE = 0.004, r^2_w = 0.002, p < .01$).

**Familiarity**

Students who drank more alcohol were more aware of the warning law ($\beta_w = 0.066, SE = 0.016, r^2_w = 0.003, p < .0001$), had more exposure to the warning ($\beta_w = 0.146, SE = 0.020, r^2_w = 0.000, p < .0001$), and more accurate memory for the risks on the label ($\beta_w = 0.080, SE = 0.024, r^2_w = 0.002, p < .0001$) than students who drank less alcohol. Memory for the risks on the label increased more pre- to postwarning for students who drank more alcohol than for students who drank less alcohol ($\beta_w = 0.063, SE = 0.020, r^2_w = 0.001, p < .05$). Students who drank more alcohol believed the risks on the label less than students who drank less alcohol ($\beta_w = -0.018, SE = 0.006, r^2_w = 0.002, p < .01$).

Students with more friends who drank alcohol had more exposure to the warning ($\beta_w = 0.024, SE = 0.008, r^2_w = 0.001, p < .01$), and more accurate memory for the risks on the label ($\beta_w = 0.022, SE = 0.010, r^2_w = 0.001, p < .05$) than students with fewer friends who drank
alcohol. The number of one’s friends who drank alcohol was unrelated to beliefs about the alcohol warning label.

Drinking directly from the alcohol container was unrelated to awareness of the alcohol labeling law and beliefs about the risks on the label. A significant interaction indicated that exposure to the alcohol warning label increased more pre- to postwarning for students who drank from the alcohol container more frequently ($\beta_w = 0.042, SE = 0.020, r^2_w = 0.001, p < .05$). Students who drank from the alcohol container had more accurate memory for the risks on the warning than students who poured the beverage into a glass ($\beta_w = 0.052, SE = 0.019, r^2_w = 0.002, p < .05$).

Watching television was unrelated to awareness of, exposure to, or memory for the alcohol warning label. Students who watched more television believed the risks on the warning less than students who watched less television ($\beta_w = -0.010, SE = 0.004, r^2_w = .001, p < .05$).

**DISCUSSION**

The purpose of this study was to determine whether receiver characteristics were associated with or moderated alcohol warning label measures. The study surveyed a large and representative sample of high school seniors who are forming lifelong attitudes about alcohol, experimenting with alcohol, and are at risk for the alcohol-related problems described on the warning. Many receiver characteristics were significantly associated with the alcohol warning measures, but the effect sizes were small. Students who were from lower SES, had lower usual grades, and were heavier drinkers were more aware of the warning label and had more exposure to the warning. Non-White students were more aware of the warning law but did not report more exposure. Students who drank from the alcohol container (can or bottle) and students with more friends who drank alcohol had more exposure to the warning. Students who were female, White, heavier drinkers, had more friends who drank alcohol, and drank from the alcohol container had more accurate memory for the risks on the warning. Students who were female, had higher grades, attended religious services more frequently, watched less television, and drank less alcohol were more likely to believe the risks on the warning.

In general, the associations between warning label measures and alcohol familiarity were in the predicted direction. Contrary to the predictions, religious service attendance was not associated with awareness, exposure, or memory. Students with lower usual grades in school were more aware of the warning law and had more exposure to the warning (adjusted for other receiver characteristics), a finding that is opposite of the predictions. The prediction that awareness, exposure, and memory would be higher for females was found but few differences
between males and females were apparent in the postwarning measurement.

Few receiver characteristics moderated awareness of, exposure to, memory for, or beliefs about the alcohol warning label. In general, interactions between warning appearance and the demographic measures tended to decrease preexisting differences between subgroups. For example, females reported more awareness of the labeling law in the pre-warning measurement but not in the postwarning measurement. Interactions involving measures of familiarity with alcohol tended to create differences between categories of receiver characteristics. As predicted, memory for the risks on the warning increased more pre- to postwarning for those students who drank more alcohol. This association between familiarity and warning label measures suggests that those people who are at the highest risk for alcohol-related problems are exposed to the warning more frequently, indicating a benefit of having a label on containers.

Several limitations must be considered when evaluating the present research. First, the cross-sectional design does not rule out the possibility that the pre- and postwarning samples were different. These samples, however, were measured in the same way and had similar receiver characteristics; the estimates were from multiple regressions that adjusted for the other measured receiver characteristics. Second, it was not possible to compare the results to a control group with no exposure to the alcohol warning label. Third, there was no validation of the students' self-reported behaviors, although the effect of self-report would have to change across measurements for it to invalidate the results. Fourth, although the high-school student sample was large and representative, the sample was rather homogeneous. Among others, samples of non-English-speaking residents, wider age ranges, and different educational backgrounds would be informative. Finally, receiver characteristics that were not measured (e.g., attitudes, hazard perceptions, or personality characteristics) could potentially be useful in explaining additional variance.

Although receiver characteristics were significantly associated with warning label measures, it should be noted that the amount of variance accounted for by each receiver characteristic was much smaller than Cohen's (1988) definition of a small effect ($r^2 = 0.0196$) in the social sciences. The small effect sizes may be a result of the homogeneous sample employed, the limited number of receiver characteristics examined, the correlational nature of the study, or that receiver characteristics do not determine who receives the alcohol warning. If the last possibility is true, then these results suggest that the alcohol warning label does not need modification to target specific subgroups of the population who are not receiving the message but might still need modification based on other criteria.
APPENDIX

Items Used for Outcome Measures

<table>
<thead>
<tr>
<th>Awareness</th>
<th>“To the best of your knowledge, is there a law requiring warning labels on cans and bottles of beer, wine, and liquor?”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure</td>
<td>“Have you seen warning labels on alcohol beverage cans or bottles?”</td>
</tr>
<tr>
<td>Beliefs</td>
<td>“Can drinking alcohol during pregnancy cause birth defects?”</td>
</tr>
<tr>
<td></td>
<td>“Can drinking alcohol impair your ability to work with machinery?”</td>
</tr>
<tr>
<td></td>
<td>“Can drinking alcohol impair your ability to drive a car?”</td>
</tr>
<tr>
<td></td>
<td>“Can drinking alcohol lead to health problems?”</td>
</tr>
<tr>
<td>Memory</td>
<td>“These questions refer to warning labels that may be written on cans and bottles of beer, wine, and liquor. Check yes for statements that you think are on the labels, and no for the ones that you think are not on the labels.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use impairs the ability to drive.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use can cause family problems.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use by a pregnant woman can harm the baby.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use can lead to addiction.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use can cause health problems.”</td>
</tr>
<tr>
<td></td>
<td>“Alcohol use impairs the ability to operate machinery.”</td>
</tr>
</tbody>
</table>

REFERENCES


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