

Application of Cognitive Principles to the Design of Direct-to-Consumer Advertising of Prescription Medications

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ABSTRACT

This research sought to determine the formats of direct-to-consumer (DTC) drug advertisements that would facilitate communication of benefit and risk information. Fictitious DTC advertisements were designed to test the effect of integrated (risk/benefit information presented in a single textual unit) versus separated (risk/benefit information presented in separate, distinct textual units). These two formats were orthogonally combined with the presence or absence of color (red) to distinguish the risk information or the risk information was the same color (black) as the rest of the text. Also included was a fifth condition in which separated risk information was made extremely salient by using an enhanced warning style similar to that advocated by the ANSI Z535 warning standard. Lastly a sixth condition was a control that lacked risk information. The 144 undergraduates and community volunteers who participated were presented 6 DTC advertisements representing 6 design formats embedded within a realistic-looking but fictitious leisure magazine in a repeated measures balanced latin square design. Advertisement effectiveness was determined by measuring performance on a knowledge test of benefit and risk information. Participants also ranked ordered advertisements on the basis of effectiveness of communicating drug uses and risks. Results showed that the presence of physical features that distinguish the risk information from other text facilitated information acquisition and increased the perceived effectiveness ranks. Implications for the design of advertisements for products with potential risks are discussed.

INTRODUCTION

Pharmaceutical manufacturers have recently begun to advertise prescription drugs directly to consumers (direct-to-consumer advertisements or DTC). DTC print advertisements in magazines and newspapers and voice advertisements in broadcast media have entered the consumer market. Previously, prescription drug marketing was mostly aimed at physicians and other medical specialists. Under the learned-intermediary doctrine, medical specialists are primarily responsible for relaying relevant benefit and risk information about prescription drugs to patients. Since physicians are often interacting with patients under time constraints, there is no guarantee that the information they communicate to patients is conveyed, understood, and retained.

Now that DTC advertisements have become more prevalent, consumers are developing knowledge of prescription medications in the absence of direct input from their physician. U.S. federal regulations require an unbiased, balanced presentation of prescription drug therapy in DTC communications. The presence of both benefits and risks is intended to aid the consumer in making informed decisions about medical care. DTC communications could potentially provide consumers with information to enhance their understanding of the medications. However, typically advertisements for most consumer products focus only on the benefits of the product, and not the risks. They, therefore, do not provide a balanced presentation of the positive and negative information necessary for good quality decision making about a drug's appropriateness. Without

adequate risk knowledge, users may make decisions or engage in behaviors that result in direct or indirect harm.

The present research examined the formatting of benefits and risks in DTC print advertisements. There are two basic ways of arranging benefit and risk information. They can be integrated into a single textual unit or physically separated as spatially distinct units.

Previous research has led to mixed conclusions regarding the effectiveness of either integrated or separated arrangements. For example, Wogalter et al. (1993) found that integrated (embedded) instructions were more effective in increasing compliance. Frantz and Rhoades (1993) also found that warnings strategically embedded in task instructions tended to be read and produced greater compliance. In contrast, Strawbridge (1986) found that embedding a warning within the text of a product label produced lower compliance than an unembedded label.

In related research, placement of safety information such as warnings has been found to be more effective when physically placed near the warned-of hazard (Wogalter et al., 1991; Wogalter et al., 1987). Additional research has shown that conspicuity, as indicated by labels with enhanced features, positively influenced product knowledge and compliance (Wogalter & Young, 1994). It is evident that factors such as placement and conspicuity are critical to comprehension and compliance.

Some information processing theorists (e.g., Wickens, 1992) might predict that integrated information would be better than separated information because it is organized as a coherent whole, allowing cued access to risk information from benefit information in memory and vice versa. In addition, the proximity compatibility principle would support the use of integrated information, because similar information grouped together in memory would reduce retrieval difficulties (Wickens & Carswell, 1995).

Conversely, separating the risk from the benefit information could be better. Separate risk information can be made highly distinctive and salient by adding features that are known to benefit noticeability-related measures, such as adding borders and symbols, and using bigger, bolder print (e.g., Barlow & Wogalter, 1993; Young & Wogalter, 1990) that otherwise would be difficult to do in an integrated format. Separated information could also reduce problems associated with top-down processing, such as overlooking information,

by allowing risk information to stand alone, without being embedded, making it more easily discriminated and noticed. Potentially the separated condition could incorporate multiple features that increase salience and aid comprehension such as the format and style of warnings recommended by the American National Standards Institute (ANSI, 1998). This facilitation could benefit information search, retrieval, and ultimately, knowledge acquisition. Thus, with the combination of noticeable features, attention is more likely to be attracted, the material is more likely to be read, and knowledge is more likely to be acquired. However, it is also possible that highly salient features could better delineate which information might be ignored.

The present research included conditions to examine these issues by utilizing integrated and separated benefit/risk communication designs to determine the degree to which each format facilitated knowledge acquisition. The influence of colors that were incongruent with the rest of the text within a DTC advertisement was also explored. An enhanced condition was also included to determine the effect of making risk information salient using features known to be useful in capturing attention (Young & Wogalter, 1990). These enhancements (use of signal icon, signal word color panel, bolder stroke width of letter characters, and larger font size) are in a separate condition since the enhancements cannot be employed easily in the integrated condition. These stimuli were presented in DTC advertisements in the context of a realistic-appearing mock-up of a full color magazine. The method employed an incidental exposure procedure in which the participants examined the magazine pages without being informed that the research specifically concerned the drug advertisements.

METHOD

Design

The experiment was comprised of six conditions (Table 1). Four were based on a 2 (Risk/Benefit Location: separated/integrated) X 2 (Distinguishability: same vs different color with respect to other ad information) design. A fifth condition was a separated format, but was highly enhanced. A sixth condition lacked risk information (control condition).

Participants

One hundred forty-four individuals participated. Seventy-two were undergraduates in introductory psychology courses and 72 were adult community volunteers. Half were female. The mean ages of the students and the community volunteers were 19.4 ($SD = 1.7$) and 29.9 ($SD = 11.5$) respectively.

Table 1. Conditions and Descriptions

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- (1) **Separated, No Color:** The risk and benefit information is physically separate. All information has the same black font.
 - (2) **Separated, Color:** The risk and benefit information is physically separate. Risk information is printed in red.
 - (3) **Integrated, No Color:** The risk and benefit information is embedded within the same section of text. All information is in the same black font.
 - (4) **Integrated, Color:** The risk and benefit information is embedded within the same text. Risk information is printed in red.
 - (5) **Separated, Enhanced:** The risk and benefit information is physically separate. The risk section was formatted based on the ANSI Z535.4 consumer product warning label standard. This section was boxed and contained a yellow signal-word panel on top with the word CAUTION and an alert icon (triangle enclosing an exclamation point) in black ink with the risk text in bold font.
 - (6) **Control:** No risk information given in ad.
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Materials

A simulated, realistic-appearing (professional quality) magazine with six fictitious DTC prescription drug advertisements was constructed. Each page was double-sided and in clear plastic protective covers in a three-ring binder. The magazine (*Raleigh: The Magazine of the Triangle*) contained full-color and black and white advertisements of different sizes for various products/services as well as articles about social and leisure activities and cultural arts in the local capital city area. The full-page professional quality drug advertisements were interspersed throughout the magazine and consisted of information derived from real drug advertisements and a Physicians Desk Reference (PDR). Each drug advertisement included three risks and one overall benefit. The 6 fictitious drug names were:

- Anxiolve (anxiety relief)
- BreathEase (nasal spray)
- Cardiziem (blood pressure control)
- Dermabrite (topical wrinkle cream for the face)
- Funganox (toe-nail fungus treatment)
- Lenoxin (allergy relief)

Advertisements were rotated through all conditions an equal number of times across participants using two balanced Latin Squares (36 combinations of ads and conditions) in a repeated measures design. Each participant saw all 6 drug advertisements, but each ad was a different design format condition.

The separated conditions displayed the risks in a separate section from the benefits. The integrated conditions displayed the risks in the same section as the benefit. The risks were either in the same black ink as the rest of the print in the ad or in red-color ink. The separated enhanced ad was based on the format prescribed by the ANSI Z535.4 (1998) consumer product warning standard, with signal word and appropriate color. Additionally, the text message in the enhanced condition was in larger bold print, and a yellow/black striped border. The control ads lacked the risk statements.

Procedure

After signing the consent form, participants completed a demographic questionnaire (age, gender, education, and ethnicity/racial information).

To assess knowledge acquired from incidental exposure, participants were not initially informed of the study's true purpose. Rather they were told it was a marketing research study concerned with the magazine's attractiveness. This method provided a more externally valid measure of knowledge acquisition. The study's procedure is similar to a method employed by Barlow and Wogalter (1993) to investigate the effectiveness of warnings in alcohol beverage advertisements.

Participants rated each page of the magazine on attractiveness. Before beginning their ratings, the task was demonstrated to participants by applying the instructions to the rating of the magazine cover. After this demonstration, participants were told that they had 30 seconds to rate each two-page spread. Each page was given a separate rating. The ratings were made using a 9-point Likert-type scale numerically and verbally anchored at the two ends as follows: 1=not at all

attractive and 9=extremely attractive. A tone sounded from a tape player to signal participants to turn the page.

After rating all of the pages, the magazine was removed and participants were given an unannounced test on knowledge of the benefits and risks with respect to the six prescription drug ads that appeared in the magazine.

After the test was completed, each participant was given all six versions of one of the six drug advertisements (rotated an equal number of times across participants) and was instructed to rank order them based on how well they conveyed the drug's uses and risks. The best version was assigned a rank of 1 and the worst version a rank of 6.

RESULTS

Two independent judges scored the knowledge tests. The reliability of the scoring (agreements/total X 100) was 98.8%. All significant results discussed below are based on $p < .05$ criterion. The mean benefit, risk, and total knowledge/comprehension scores and effectiveness ranks are shown in Table 2.

Benefit knowledge

An ANOVA on benefit knowledge showed a significant effect of conditions, $F(5, 715) = 2.69, p < .05$. Paired comparisons using Tukey's HSD showed that significantly more information was recalled in the separated/color and integrated/color conditions than the separated/no color and control conditions. Also, the integrated no color condition was significantly higher than the control condition. A 2 (separated vs. integrated) X 2 (color: absent vs. present) ANOVA on the four conditions did not show significant effects.

Risk knowledge

An ANOVA on the risk knowledge test scores showed a significant effect of conditions, $F(5, 715) = 10.33, p < .0001$. Paired comparisons indicated that participants in the enhanced condition correctly answered significantly more risk information than all other conditions. The information in the control ads was significantly lower than all other conditions except for the separated/no color condition. A 2 (separated vs. integrated) X 2 (color: absent vs. present) ANOVA on the four conditions failed to show significant effects.

Total (benefit & risk) knowledge

Mean total knowledge scores were derived by totaling the three risk scores and the one benefit score and dividing by four. An ANOVA of the total knowledge (benefit and risk) scores showed that the enhanced condition produced significantly higher scores than all conditions except the separated/color condition, $F(5, 715) = 8.38, p < .0001$. The control condition produced significantly lower total scores than the other conditions except the separated/no color condition. A 2 (separated vs. integrated) X 2 (color: absent vs. present) ANOVA showed a significant effect of color, $F(1, 143) = 4.68, p < .05$. Greater knowledge was found when the risks were printed in color ($M = .25$) than when color was absent ($M = .22$). No other effect in the ANOVA was significant.

Communication effectiveness ranks

Participants were asked to rank advertisements based on effectiveness of conveying uses and risks of the drugs. With ranks, low scores indicate higher effectiveness of communicating drug uses and risks. A Friedman nonparametric test showed a significant effect of conditions, $X^2(5, n=144) = 482.9, p < .0001$. Paired comparisons showed that all experimental conditions differed significantly from each other.

The Wilcoxon signed-rank test, which compares mean ranks for ordinal level data, was used to make pairwise comparisons. Since the number of post hoc pairwise comparisons would increase experiment wise error, a Bonferroni alpha correction was used, resulting in a more conservative criterion for statistical significance. Paired comparisons showed that all experimental conditions differed significantly from each other. The exception was between the two best ranked (most preferred) conditions which did not differ (the separated/color and enhanced conditions).

A 2 (separated vs. integrated) X 2 (color: absent vs. present) analysis was significant for both main effects, $F(1, 43) = 153.2, p < .0001$ and $F(1, 143) = 305.5, p < .0001$ respectively. There was no significant interaction. Separated ($M = 2.86$) risks/benefits were given higher effectiveness ranks than integrated ($M = 3.81$) versions. Color was given higher effectiveness ranks than no color.

Table 2. Mean Knowledge Scores for Benefit, Risk, and Total Information as a Function of DTC Prescription Drug Advertisement Condition. Preference ranks are shown on the last row (low scores indicate greater preference).

	Condition					
	Separated (No Color)	Separated (Color)	Integrated (No Color)	Integrated (Color)	Separated (Enhanced)	Control (No Warning)
Benefit	.53	.67	.62	.64	.59	.50
Risk	.09	.13	.10	.11	.22	.04
Total (Benefit + 3 Risks)	.20	.26	.23	.24	.31	.15
Effectiveness rank	3.7	2.0	4.6	3.0	1.9	5.8

DISCUSSION

The results showed that conspicuity was a substantial factor in the outcome of this experiment. Mainly this can be seen by the better knowledge scores for the separate/color and the separate enhanced condition. These findings are consistent with a study by Young and Wogalter (1990) showing highlighting information in owner's manuals facilitated knowledge acquisition. If the risk information lacks conspicuity such as having color or other prominent features, then the information may not be seen or read.

To communicate medication risks, the present results suggest that the enhanced condition was the best among the conditions investigated. While this condition showed a slight reduction in knowledge of the benefit material, this drop was not significant. The next best condition, the separated/color condition, did not enhance knowledge of the risks to the same level as the enhanced condition. Note that the two best conditions involved the use of separated information along with color.

Other than the factors investigated in the present study, few DTC placement or design principles are currently known. Since the use of DTC pharmaceutical advertising is increasing, additional design principles should be determined. Consumers are now forming impressions and applying decision-making processes that ultimately lead to requests for specific prescription medications based upon DTC advertisements. These same advertisements are primarily focused on marketing by using principles of persuasion. User-centered design approaches that produce balanced risk and benefit

information are likely to facilitate consumers' ability to make informed decisions about available drug therapies.

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