DIRECT-TO-CONSUMER (DTC) ADVERTISING OF PRESCRIPTION MEDICATIONS ON THE WORLD WIDE WEB: ASSESSING THE COMMUNICATION OF RISKS

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ABSTRACT

Recently, drug manufacturers have been increasingly marketing their prescription medications using Direct-to-Consumer (DTC) advertisements. The current study examines the effects of integrating and separating the risks and benefits within a prescription medication DTC web site advertisement. The study also examined the effects of presenting the risk and benefits at different levels of a web site. Two different drug web sites and two different task types (general browsing and item search) were used. Risk recall, recognition, time-on-task, click rate, and task success were measured. Results from the current study indicated that risk information was found faster, with less clicks, and remembered more often when placed on a second level page linked from the home page. However, the risk information was more difficult to find when it was placed on a fourth level page without a link on the home page. The pattern of effects with the two tasks was similar. No significant differences were found between the two drugs. A set of guidelines is provided for the development of DTC prescription drug web sites based on the results. It is beneficial (a) to present separate risk and benefit information sections and (b) to place risk and benefit information in the top section of the home page or to prominently place a link to the risk information on the home page.

INTRODUCTION

Since the mid 1980s, considerable research has been conducted on how warnings influence people's knowledge and cautionary behavior. However, experimental research into the effectiveness of pharmaceutical warnings is relatively limited. Effective pharmaceutical labeling is crucial, as the general public is often unaware of the associated risks and side effects (Wilkes, Bell, & Kravitz, 2000). Besides the information provided by physicians and other health care providers, the primary sources of prescription medication information are drug labels and inserts and Direct-to-Consumer (DTC) advertising.

DTC advertisements are used to market prescription medications directly to the general public. Drug companies employ many different types of media in their prescription medication DTC advertisement campaigns, including: print ads, television and radio ads, and the World Wide Web (WWW).

There are Federal regulations (FDA, 1999) concerning the communication of risk and benefit information that drug manufacturers must attend to in their prescription medication DTC advertisements (e.g., print ads must include all the risks inherent in a drug, whereas, broadcast ads only require the most important risks with a pointer to the complete set of risk information). However, there has been little research on the factors that facilitate (or hinder) the communication of this information. For example: should risk information be integrated with the benefit information or is it more effective to separate the risks and benefits?

The warnings literature has not provided consistent, conclusive results for the issue of the relative placement of risk and benefit information. Furthermore, there has been no research published concerning how best to present risk and benefit information on prescription drug advertisement web sites. Should risk information be integrated within a drug's benefit information to increase the likelihood that they are both encountered and read by consumers (Frantz & Rhoades, 1993) or should the risk information be separated from the benefit information allowing for the use of highlighting to attract attention (Wogalter, Mills, Paine, & Smith-Jackson, 1999)?

Related to this question is the effect of risk information placement within a web site's hierarchy. Does risk information need to be placed on the drug's home page to ensure that it is seen and read or can the risk information be placed at different levels of the web site's hierarchy and still have the same likelihood of being found and read?

The current study manipulated the risk and benefit information within the web sites for two prescription medications to determine their effects on the likelihood of people noticing and reading the risk information. The risk and benefit information was either integrated together or separated, and placed on the same page or on different pages at different levels of the web site's hierarchy. Two different drugs and task types (general browse and item search) were employed to determine the generilizability of the results across different types of drugs and web site browsing techniques.

METHOD

Participants

One hundred sixty-four participants were recruited from introductory psychology courses at a local university. They were given course credit for their participation.

Materials

Web sites for two existing prescription pharmaceuticals (Celebrex®, Pharmacia Corporation, Peapack, N.J. and Singulair®, Merck & Co., Inc. Whitehouse Station, NJ) were used. Within each drug, the web site versions differed only in the placement of the risk and benefit information. The risk and benefit information was (a) either placed in the same paragraph (integrated) or in separate sections (separated); (b) either placed on the same page or different pages of the web site; and (c) either placed on the same level of the web site or on different levels of the web site's hierarchy. See Table 1 for experimental conditions.

Table 1. Experimental Conditions.

Condition:	Description:
Control	No risks or benefits were given on the web site.
Integrated-home	Risks and benefits were presented in the same paragraph on the home page.
Separated-home	Risks were presented separately from the benefits on the home page.
Separated-mixed level	Risks were presented on a 2nd level page. Benefits were presented on the home page. A link to "risks" was placed in the left navigation bar.
Separated-second level	Risks and benefits were presented on two separate 2nd level pages. Two salient links labeled "Benefits" and "Risks" were prominently placed in the left navigation bar.
Integrated-second level	Risks were presented with the benefits on a 2nd level page. A salient "Benefit and Risk Information" link was placed in the left navigation bar.
Separated-fourth level	Risks were presented on a 4th level page. Benefits were presented on the home page. A link to "risks" was located on a 3rd level page.

Six other product (non-drug) web sites (distractor sites), comparable in size and complexity to the experimental drug web sites, were downloaded and saved on a computer's hard drive. All web sites were realistic in appearance and functionality and represented a wide range of consumer products, such as: soap, kitchen/bath cleaner, photocopying service, beverage distributor, a restaurant, and art supplies. The web sites were saved to a local hard drive to control download times and to keep users in the appropriate web domains.

Procedure

Upon entering the study, participants were interviewed as to their web surfing experience. They were asked to complete a consent form and a demographics form. They were then provided with a general overview of the tasks that they would be asked to perform. Participants were randomly assigned to one of the two tasks and drug conditions. Within each task, product web site order, drug web site, and experimental version were randomized.

Item Search. Participants were asked to find specific pieces of information on the different product web sites. Before beginning, participants were given three practice tasks to complete and instructed on how to use the web browser. The ErgoBrowser® (ErgoSoft Laboratories®, Austin, TX) software application was used to track participants' progress through the web sites (clicks per task) and their time on task. The ErgoBrowser is a software package that provides basic web browser functionality, including: forward/back buttons, stop page downloads, URL entry, and up/down left/right scrolling ability. The ErgoBrowser also contains a task-tracking device that required participants to press a "start task" button before beginning a task and then press a "stop task" button upon completing the task. All tasks started at the particular web site's home page.

Upon completing the practice tasks and becoming familiar with the ErgoBrowser, participants were given a set of six tasks to complete with one of the randomly assigned experimental drug's web sites. One of the tasks required the participants to find the drug's risk information; another required the participants to find the drug's benefit information. The other four tasks required the participant to find other specific pieces of information on the web sites.

Browse. Participants were asked to browse several different product web sites with the purpose of rating the usefulness of the information on the web site, the web site's attractiveness, and their willingness to use the product advertised. This distractor task was used to encourage the participants to freely browse the web sites without drawing specific attention to the drug's risk and benefit information.

Participants were randomly presented with the six distractor product web sites and one of the experimental drug's web sites (randomly assigned) and given a three-minute time limit to freely browse each web site before making their ratings.

After rating each of the web sites, participants were given a previously unannounced (surprise) free recall test. Participants were asked to record as many of the risks that they could recall from the experimental drug's web site. Upon completing the free recall test, participants were given a recognition task to complete that required the participants to identify the drug's risks embedded within a list of distractor items.

RESULTS

Scoring

The item search time-on-task scores (measured in seconds) were transformed into Log_{10} scores for use in the analyses because of the substantial variability in the data. Means and standard deviations in Log_{10} seconds and raw seconds are given in the data summaries.

The browse task scores were transformed into percentages to allow comparison across the recall and recognition tasks. Participants were given a point for each risk they correctly recalled and recognized. For each participant points were summed for a total risk and recognition score. Two judges, blind to experimental conditions, were used to score the browse task recall responses. Inter-rater reliability coefficients were high for both drugs: $rs = .91$ and $.99$, $ps < .0001$ (Celebrex and Singulair, respectively).

Analyses

Multivariate analyses of variance (MANOVAs) were used because of the large number of dependent variables and to control for Type I error. MANOVAs were first conducted with the independent variable interaction models. If the interaction model was not significant, separate MANOVAs were conducted with the main effect models.

Analyses of variance (ANOVAs) were used following statistically significant MANOVA models. Fisher's Least Significant Difference (LSD) post hoc tests were used to determine if the means differed significantly from one another using a two-tailed alpha level of .05.

To further explore the data, web site conditions that presented the risks on the same hierarchical level of the web site were collapsed and used in some of the analyses. Due to the space constraints of the current paper only the significant results are described.

Search and Find Scores

All Experimental Conditions. The 7 (version) by 2 (drug) MANOVA and the one-way drug MANOVA on the item search scores were not significant, *p*s > .05. However, the one-way web site version MANOVA on the item search scores was significant: Wilkes Lambda = 0.20, F (36, 319) = 3.91, $p < .0001$.

The significant one-way web site version ANOVAs were: time to find risks: F (6, 77) = 6.49, $p < .0001$; number of clicks to find risks: F (6, 77) = 4.65, $p < .001$; and risk task success: F (6, 77) = 8.49, $p < .0001$.

Main effect means and standard deviations can be found in Table 2. Participants in the separated second and mixed level conditions found the risks significantly faster than participants in the integrated-home, separated-fourth level, and control conditions. Participants found the risks significantly faster in the integrated home and second level conditions, the separated-home condition, and fourth-level condition compared to participants in the control conditions.

Participants found the risks in significantly fewer clicks in the separated second and mixed level conditions compared to participants in the separated-fourth level and control conditions. Participants found the risks in significantly fewer clicks in the integrated home and second level conditions and the separated-home condition compared to participants in the control conditions.

Participants in all of the experimental conditions had a significantly higher risk task success score than participants in the control conditions.

Home vs. Second Level. These analyses examined risk information placed on the home page (separated-home) vs. a second level page (collapsed separated second and mixed level conditions). The 7 (version) by 2 (drug) MANOVA and the one-way drug MANOVA on the item search scores were not significant, *p*s > .05. However, the one-way web site version MANOVA on the item search scores was significant: Wilkes Lambda = 0.61, F (6, 29) = 3.07, $p < .05$. The significant one-way web site version ANOVAs were: time to find the risks: F (1, 34) = 4.86, $p < .05$; and number of clicks to find risks: F (1, 34) = 7.07, $p < .05$.

Participants found the risks significantly faster when they were placed on a second level page ($\log_{10}$: M = 2.59, SD = 0.76; seconds: M = 18.96, SD = 20.79) compared to when they were placed on the home page ($\log_{10}$: M = 3.38, SD = 1.41; seconds: M = 69.67, SD = 86.52). Participants found the risks in significantly fewer clicks when they were placed on a second level page (M = 2.38, SD = 1.06) compared to when they were placed on the home page (M = 7.50, SD = 9.46).

Home vs. Second vs. Fourth Level. These analyses examined risk information placed on the home page (separated-home) vs. a second level page (collapsed separated second and mixed level conditions) vs. a fourth level page (separated-fourth level). The 7 (version) by 2 (drug) MANOVA and the one-way drug MANOVA on the item search scores were not significant, *p*s > .05. However, the one-way web site version MANOVA on the item search scores was significant: Wilks Lambda = 0.36, F (12, 80) = 4.44, $p < .0001$. The significant one-way web site version ANOVAs were: time to find risks: F (2, 45) = 16.36, $p < .0001$ and number of clicks to find risks: F (2, 45) = 10.28, $p < .001$.

Participants found the risks significantly faster when they were placed on a second level page ($\log_{10}$: M = 2.59, SD = 0.76; seconds: M = 18.96, SD = 20.79) compared to when they were placed on the home page ($\log_{10}$: M = 3.38, SD = 1.41; seconds: M = 69.67, SD = 86.52) or a fourth level page ($\log_{10}$: M = 4.56, SD = 0.83; seconds: M = 126.59, SD = 90.67). Participants found the risks in significantly fewer clicks when they were placed on a second level page (M = 2.38, SD = 1.06) compared to when they were placed on a fourth level page (M = 11.42, SD = 6.80). The number of clicks to find the risks when they were placed on the home page (M = 7.50, SD = 9.46) was intermediate and not significantly different than the other two conditions.

Browse Scores

All Experimental Conditions. The 7 (version) by 2 (drug) MANOVA on the browse task scores was not significant, $p > .05$. The one-way drug MANOVA on the browse task scores was significant: Wilks' Lambda = 0.47, F (6, 77) = 4.65, $p < .001$. The one-way web site version MANOVA on the browse task scores was also significant: Wilks' Lambda = 0.48, F (36, 319) = 1.63, $p < .05$.

The significant one-way web site version ANOVAs were: percentage of risks recalled: F (6, 77) = 3.94, $p < .01$ and percentage of risks recognized: F (6, 77) = 3.99, $p < .01$. The one-way drug ANOVAs for the risk scores were not significant (*p*s > .05).

Main effect means and standard deviations can be found in Table 3. Participants in the separated second and mixed level conditions recalled significantly more risks than participants in the integrated-home, separated-fourth level, and control conditions. Participants in the integrated-second level condition recalled significantly more risks than participants in the separated-fourth level condition.

Participants in the separated-mixed level condition recognized significantly more risks than participants in the integrated-home, separated-fourth level, and control

Table 2. Search and find task scores for each of the experimental web site versions.

Web Site Version	Risks Time			Risk Clicks			Risk Correct		
	Mean	(STD)	LSD	Mean	(STD)	LSD	Mean	(STD)	LSD
Separated-Mixed	18.43	(14.99)	A	2.33	(0.89)	A	1.00	(0.00)	A
Separated-Home	19.49	(26.04)	A	2.42	(1.24)	A	0.92	(0.29)	A
Integrated-Second	59.62	(105.62)	AB	5.25	(6.28)	AB	1.00	(0.00)	A
Separated-Second	69.67	(86.52)	AB	7.50	(9.46)	AB	0.83	(0.39)	A
Integrated-Home	120.37	(151.65)	B	7.33	(8.61)	AB	0.83	(0.39)	A
Separated-Fourth	126.59	(90.67)	B	11.42	(6.80)	BC	0.92	(0.29)	A
Control	260.80	(202.64)	C	17.67	(16.68)	C	0.25	(0.45)	B

* Means with different letters are significantly different ($p < .05$).

Table 3. Browse task scores for each of the experimental web site versions.

Web Site Version	Risks Recalled			Risks Correct Recognized		
	Mean	(STD)	LSD	Mean	(STD)	LSD
Separated-Second	2.00	(1.81)	A	4.50	(2.15)	AB
Separated-Mixed	2.42	(2.23)	A	4.75	(3.25)	A
Integrated-Second	1.50	(1.68)	AB	3.67	(3.17)	AB
Separated-Home	1.33	(1.37)	ABC	3.00	(2.26)	ABC
Integrated-Home	0.58	(1.17)	BC	2.75	(2.53)	BC
Control	0.33	(0.65)	BC	1.25	(1.06)	C
Separated-Fourth	0.25	(0.62)	C	1.41	(1.44)	BC

* Means with different letters are significantly different ($p < .05$).

conditions. Participants in the integrated and separated second level conditions recognized significantly more risks than participants in the control conditions.

Home vs. Second Level. These analyses examined risk information placed on the home page (collapsed integrated-home and separated-home conditions) vs. a second level page (collapsed separated second and mixed level conditions).

The following analyses compared the collapsed home (integrated and separated) vs. the collapsed second level (separated second and mixed and integrated) conditions. The 7 (version) by 2 (drug) MANOVA and the one-way drug MANOVA on the browse task scores were not significant, *ps* > .05. However, the one-way web site version MANOVA on the browse task scores was significant: Wilkes Lambda = 0.81, F (4, 55) = 3.26, $p < .05$. The significant one-way web site version ANOVAs were: percentage of risks recalled: F (1, 58) = 5.17, $p < .05$ and percentage of risks recognized: F (1, 58) = 4.15, $p < .05$.

Participants recalled (M = 16.44%, SD = 15.87) and recognized (M = 35.89%, SD = 23.81) significantly more risks when they were placed on a second level page compared to when they were placed on the home page (M = 7.99%, SD = 10.85 and M = 23.96%, SD = 19.55, respectively).

Home vs. Second vs. Fourth Level. These analyses examined risk information placed on the home page (separated-home) vs. a second level page (collapsed separated second and mixed level conditions) vs. a fourth level page (separated-fourth level). The 7 (version) by 2 (drug) MANOVA and the one-way drug MANOVA on the browse scores were not significant: *ps* > .05. However, the one-way web site version MANOVA nearly reached the conventional significance level of .05: Wilks Lambda = 0.71, F (8, 84) = 1.96, p = .06. The significant one-way web site version ANOVAs were: percentage of risks recalled: F (2, 45) = 5.99, $p < .01$ and percentage of risks recognized: F (2, 45) = 7.77, $p < .01$.

Participants recalled (M = 18.40%, SD = 16.66) and recognized (M = 38.54%, SD = 22.50) significantly more risks when they were placed on a second level page compared to when they were placed on a fourth level page (M = 2.08%, SD = 5.18 and M = 11.81%, SD = 12.03, respectively). Recall (M = 11.11%, SD = 11.42) and recognition (M = 25.00%, SD = 18.80) scores for risks placed on the home page were intermediate and not significantly different than the other two conditions.

DISUCSSION

The results show that people have difficulty finding risk information at deeper levels of a web site hierarchy. If important information is placed three or more clicks from the home page, consumers looking for that information may never find it.

Significantly lower task times, fewer clicks, and greater recall and recognition scores were obtained when the risks were presented separately on a second level page with a link in the navigation bar compared to when they were presented on a fourth level page without a link in the navigation bar.

These results suggest that important risk and safety information should be linked from the home page to facilitate the likelihood that they will be noticed and read. Placing risk and other important safety information on pages deep within a DTC prescription medication web site's hierarchy without a prominent link on the home page will decrease the likelihood that the information is seen and read by the consumer.

Significantly lower task times and significantly greater risk recall and recognition scores were obtained when the risks were presented separately on a second level page compared to

being integrated with the benefit information on the home page. Although one would expect to find better performance when the risks were presented on a drug's home page, these results are not necessarily unexpected. Previous research involving DTC print advertisements has found greater risk information acquisition when a distinct risk information section is presented compared to when the risks and benefits were integrated (Wogalter et al., 1999).

The final finding of interest concerns the tendency for the risks to be remembered more often and found faster and with less clicks when they were presented separately on a second level page compared to when they were presented on the drug's home page. This pattern suggests that the participants tended to look for links to important information in the left navigation bar rather than search for the information on the drug's home page. However, this finding might have been influenced to some unknown degree by the placement of the risk information on the home page. The risks were placed lower on the home page than the benefits and other drug information as generally occurs in real web advertisements. Nevertheless, had the risk information been presented higher on the home page, before the other drug information, it may have been easier to notice and find.

The importance of this finding is highlighted by a recently conducted study that found that drug risk information tends to be less accessible on DTC prescription medication web sites than benefit information (Hicks, Vigilante, & Wogalter, 2001). Evaluating actual DTC drug ad web sites, Hicks et al. (2001) found that in general more clicks are required to find the risk information than benefits. Scrolling was also required more often to find the risk information than benefits.

Together, the findings from previous web usability research, the findings from Hicks et al. (2001), and the findings from the present study, suggest that DTC web sites should place benefit information on the home page; place risk information in the top half of the home page separated from other web site information; or provide a prominent link to the risk information at the top of the home page. If a link to the risk information is used, it should be placed in an area of the web page that consumers tend to look: the top of the left hand navigation bar or the top center of the page (Lynch & Horton, 1999).

U.S. Federal regulations require an unbiased, balanced presentation of prescription medication information in DTC advertisements (FDA, 1999). This regulation directs the manufacturer to provide the consumer with a comparable amount of risk and benefit information within the advertisement, and that the risk information must include all the major risks associated with a drug. The purpose of this regulation is intended to aid consumers in making an informed decision with regard to drug use (FDA, 1999).

However, these regulations do not account for the effects of information placement and accessibility on the balance of the information presented. Presenting the same number of risks as benefits on a DTC prescription medication web site advertisement (or any DTC drug advertisement) does not guarantee that the end-users will notice, retain, or base their decision upon a balanced amount of risk and benefit information.

The data from this study suggest that the amount of remembered risk information relative to remembered benefit information (balance of information) was related to the ease of finding the risk information; this was related to its placement on a web page and within the web site hierarchy. The current results suggest that DTC prescription medication web site guidelines should be directed towards facilitating access to important risk and benefit information rather than simply requiring a balance of risk and benefit information without regard to how it is presented.

In conclusion, the results indicate that the placement of risk information within DTC prescription medication advertisement web sites can affect the likelihood that consumers will find and read the important safety information. Drug manufacturers should evaluate the placement of important medication information on their web sites (using web usability techniques) to maximize its usability by consumers

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