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Actors in Whitespace: Communicating Risk Information on Pharmaceutical Websites

Amie C. O'Donoghue¹, Helen W. Sullivan¹, Douglas J. Rupert², Jessica Fitts Willoughby², Kathryn J. Aikin, Ph.D.¹

¹U.S. Food and Drug Administration, Silver Spring, MD

²RTI International, Research Triangle Park, NC

Abstract

This study examined the use of an actor to communicate prescription drug risks on pharmaceutical websites. Participants viewed risk information for a fictitious drug in one of several static visual formats or as a paragraph plus an animated actor; and with or without a signal directing them to the risk information text. The signal had little effect on outcomes. Format did not affect risk processing, but participants in the actor condition thought the website placed less emphasis on benefits. Actors communicating risk information on a pharmaceutical website do not appear to improve consumers' understanding of prescription drug information.

Keywords

animation; direct-to-consumer promotion; prescription drugs; risk communication; online video

The Internet has revolutionized how people search for health information. Recent research shows that 87% of U.S. adults use the Internet, and 72% of these adults searched for health information online within the last year (Pew Research Center, 2015). Pharmaceutical companies have capitalized on this channel by developing websites for prescription drugs. Although pharmaceutical Internet spending continues to make up a smaller proportion of spending than more traditional routes of promotion, it is growing at a much higher rate (Mackey, Cuomo, & Liang, 2015). The use of websites for pharmaceutical information increased after the U.S. Food and Drug Administration (FDA) issued guidance for the industry, which suggested websites as one of four options for providing detailed risk information (FDA, 1999). Since that time, research has demonstrated that websites and healthcare providers are the most common sources of risk information, more so than toll-free telephone numbers and concurrently running print ads (Kim, Mayhorn, & Wogalter, 2010).

Prescription drug websites are required by law to convey a fair balance of information about the benefits and risks of each drug (Federal Food, Drug, and Cosmetic Act, 21 U.S.C. §§ 502(a) & (n) see also 21 C.F.R. 202.1(e)(5)). There are multiple ways to present information about drug risks and benefits on websites, but most pharmaceutical websites present risk

information in small text at the bottom of the homepage, typically requiring individuals to scroll down to read the complete risk information (Hicks, Wogalter, & Vigilante, 2005; Sheehan, 2007). A content analysis of enforcement letters against pharmaceutical websites showed that of 179 violations cited in FDA letters from 2005–2014, most involved a lack of or a misrepresentation of risk information (Kim, 2015). Moreover, Wymer (2010) questioned respondents about 20 branded pharmaceutical websites selected for their poor presentation of safety information and found that respondents believed the websites contained true and objective information that met minimum FDA requirements.

Risk information on pharmaceutical branded websites is often presented as a text paragraph, whereas websites for consumer goods increasingly present product information through video and audio. In an effort to distinguish themselves from competitors, pharmaceutical companies may opt to present information using novel methods, such as using a life-like character to describe prescription drug characteristics. Davis (2010) examined the presentation of risk information on prescription drug websites in text or via a speaking avatar. He found that recall of information about the advertised drug, the medical condition, and the recommended lifestyle changes was higher in text conditions than in avatar conditions and that participants preferred text to avatar-provided information. Although Davis' study provides a starting point for examining relevant issues on direct-to-consumer (DTC) websites, questions remain about how communicating drug information via actual actors compares to communicating via multiple text formats.

Several other studies have examined the use of animated characters in learning contexts, and the results have been mixed (Craig et al., 2002; Lester, et al., 1997; Mayer et al., 2003; Moreno et al., 2001). Some studies found that characters positively influenced learning outcomes (Moreno et al., 2001, Study 1; Mayer et al., 2003, Study 1), whereas some found no effects of characters (Craig et al., 2002; Moreno, 2006; Moreno et al., 2001, Studies 4, 5). Much of this variability originates from differences in whether the character is interactive and vivid and how many sensory modes the presentation embodies (Coyle & Thorson, 2001; Moreno et al., 2001). Research regarding the vividness of websites suggests that adding video and audio will result in more positive attitudes toward the brand and intentions to purchase the brand (Coyle & Thorson, 2001). None of the characters in the previous research involved actual actors; therefore, we thought that the live-action nature of the actual human actor would increase the vividness of the website. As Coyle and Thorson (2001) had done, we included audio and animation that began as viewers opened the website. Instead of brand attitudes, however, we focused on the communication of risk information.

The purpose of this study was to conduct a robust examination of how live action actors compare to various text formats in delivering drug risk information on branded drug websites.

Hypothesis 1: Presenting risk information via a speaking and moving actor on the screen will lead consumers to have greater perceived risk and greater risk retention than presenting this information in any text format.

The live-action actor is a novel approach for DTC website promotion; therefore our study focused on how the presentation of drug risks on a DTC website by an actor differed from various text presentations of risk information (i.e., a paragraph, bulleted list, checklist, and highlighted box). These formats were selected based on literacy guidelines for improving attention to and retention of information and are more fully discussed in Sullivan, O'Donoghue, Rupert, Willoughby, and Aikin (2017). Although the processing of both the risks and the benefits is critical in the context of a prescription drug ad, we tested an actor who presented only the risk information because past research has shown that risks tend to be downplayed on pharmaceutical websites (Kim, 2015).

Hypothesis 2: Participants in the high risk visibility condition will have greater risk retention and greater risk perceptions than those in the low risk visibility condition.

Additionally, we explored the use of a signal to call attention to the risk information (risk visibility). Participants either saw or did not see a statement to attend to risk information further down the page. We expected the signal to increase attention to and memory for the risk information, but did not predict a particular interaction among risk visibility and the formats.

Method

Design

Based on these hypotheses, we conducted a randomized experimental study to examine how actors on prescription drug websites influenced retention of key information and perceptions of drug characteristics. To enhance generalizability, we conducted the study with two different samples: participants diagnosed with high cholesterol ($n = 2,119$) and participants diagnosed with seasonal allergies ($n = 2,115$). Participants viewed a website for a fictitious prescription drug (*Pexacor* for high cholesterol, *Glistell* for seasonal allergies) and then completed a short online questionnaire. We tailored the stimuli and questions to each sample; therefore, we did not statistically compare the two illness groups.

This study was part of a larger experiment (Sullivan et al., 2017), and the results presented here focus on five risk information format conditions and two risk information visibility conditions. First, we randomly assigned participants to one of five format conditions that varied how the drug risk information was presented on the website: (1) a paragraph, (2) a bulleted list, (3) a checklist, (4) a highlighted box, or (5) delivered audibly by a live-action female actor (Figure 1). In the actor condition, the risk information also appeared in paragraph text on the website, meaning that risk information was present in text in all conditions. Second, we randomly assigned participants to one of two risk information visibility conditions that varied whether or not there was a signal directing participants to the text risk information ("Please see Important Safety Information below"). The larger experiment also included a risk information visibility condition that placed risk information on a secondary page; however, participants in the secondary page plus actor conditions were inadvertently terminated if they did not visit the secondary page. Therefore, we conducted analyses without the secondary page conditions. Results with the secondary page conditions—but without the actor conditions—are not reported in this paper.

Participants

We recruited participants from GfK's KnowledgePanel, which is a nationally representative online panel of U.S. adults. The panel is assembled by randomly sampling the U.S. adult population using random digit dialing and address-based sampling (DiSogra, Cobb, Chan, & Dennis, 2011; GfK Custom Research, 2013). We invited adult panelists who were pre-screened for high cholesterol ($n = 10,125$) or seasonal allergies ($n = 10,904$) to participate in the study. To be enrolled, panelists had to respond to the invitation, consent to participate, confirm their eligibility (i.e., diagnosed with high cholesterol or seasonal allergies and either still had the condition or had taken medication for it in the past 12 months), and be able to view the website (including the actor, if applicable). For the current study, we analyzed data for 2,119 high cholesterol participants and 2,115 seasonal allergies participants (Table 1).

Procedure

After confirming eligibility, we directed participants to their assigned fictitious drug website and asked them to review the website carefully. Participants were allowed to view the website for as long as desired. Based on pretest results, the actor spoke automatically upon opening the website and could not be paused or muted, thus forcing exposure to the manipulation. Because we based the fictitious drugs on real-life products and high cholesterol medications have more risks, the high cholesterol actor spoke for 85 seconds, and the seasonal allergies actor spoke for 53 seconds. Once the actor finished, participants were allowed to replay the actor's oration as many times as desired. After viewing the website, participants were directed to an online questionnaire (see measures below) and could not return to the drug website.

Measures

We recorded how long participants spent viewing the homepage. We excluded outliers, defined as any value larger than the third quartile plus 1.5 times the interquartile range. In the actor conditions, we recorded whether participants were fully or partially exposed to the actor's message and whether they replayed the actor. Partial exposure occurred if participants left the website before the actor's message ended.

To measure retention of risk information, we asked recall and recognition questions. For recall, we asked participants to list the side effects of the drug in an open-ended text box. Two raters coded the open-ended responses, and we summed the number of correct risks listed to create a measure of risk recall (0 to 12 for high cholesterol and 0 to 10 for seasonal allergies). For recognition, we presented participants with eight statements about the drug and asked whether each was mentioned on the website as a risk of the drug or not. Four of these statements were risks of taking the drug (e.g., "Glistell can make it difficult to concentrate"), and four statements were *not* risks of taking the drug (foils; e.g., "A side effect of Glistell is nausea"). We summed the number of correct responses to create a measure of risk recognition (range 0–8). We treated participants who skipped the risk recall and recognition measures as retaining no risk information by coding missing responses as 0.

We measured perceived risk with two items. First, participants reported how many people taking the drug (out of 100) they expected would have any side effects (perceived risk

likelihood). Because this variable was positively skewed, we used a log transformation. Second, participants reported how serious any side effects would be on a 6-point scale (1 = *not at all serious*, 6 = *very serious*; perceived risk magnitude).

To measure retention of benefit information, we asked recall and recognition questions. For recall, we asked participants to list the benefits of the drug in an open-ended text box. Two raters coded the open-ended responses, and we summed the number of correct benefits listed to create a measure of benefit recall (0 to 3 for high cholesterol and 0 to 7 for seasonal allergies). For recognition, we presented participants with eight statements about the drug and asked whether each was mentioned on the website as a benefit of the drug or not. Four of these statements were benefits of taking the drug (e.g., "Glistell treats seasonal allergy symptoms"), and four statements were *not* benefits of taking the drug (e.g., "Glistell treats indoor allergy symptoms"). We summed the number of correct responses to create a measure of benefit recognition (range 0–8). We treated participants who skipped the benefit recall and recognition measures as retaining no benefit information by coding missing responses as 0.

We measured perceived efficacy with two items. First, participants reported how many people taking the drug (out of 100) they anticipated the drug would work for (perceived efficacy likelihood). Because this variable was negatively skewed, we transformed the data by taking the square root. Second, participants reported on a 6-point scale how effective the drug would be if it worked (1 = *would eliminate very few symptoms*, 6 = *would eliminate all symptoms*; perceived efficacy magnitude).

We asked participants to rate the drug's overall risks and benefits on a 7-point scale (1 = *risks outweigh benefits*, 7 = *benefits outweigh risks*; risk-benefit assessment).

We asked participants to rate the balance of benefit and risk information on the website on a 7-point scale (1 = *more emphasis on risks*, 7 = *more emphasis on benefits*; website balance).

We measured demographic variables of age, sex, race, ethnicity, and educational level. We asked participants how severe their medical condition was (illness severity), how long it was since they were diagnosed (time since diagnosis), and whether they were taking a prescription drug for their condition (prescription status). We also measured health literacy (Chew et al., 2008) and web navigation skills (Novak, Hoffman, & Yung, 2000).

Analyses

We conducted ANOVAs and chi-square tests to examine website viewing behavior. We used ANOVA to test whether replaying the actor's message was associated with outcome variables. For significant associations, we conducted the analyses for that outcome variable with and without participants who replayed the actor's message. If the results changed when participants were excluded, we noted it in the results section.

We conducted ANOVAs to examine the main effects of format and risk visibility and the interaction between these variables, with significance defined as $p < .05$. When a main effect was significant, we conducted pairwise comparisons (t-tests) to determine whether the actor condition significantly differed from each of the other four formats using a Bonferroni-

adjusted significance level of $p < .0125$ (.05/4 comparisons). Weighted data were used in all analyses to account for nonresponse, noncoverage, underrepresentation of minority groups, and other types of sampling and survey error.

Results

Website Viewing Behavior

High cholesterol—Participants in the actor condition spent longer on the homepage (114.56 seconds) than participants in the other format conditions (103.20 seconds), $F(1, 1753) = 4.38$, $p = .04$. Risk visibility did not affect time spent on the homepage. Most participants in the actor condition (78.7%) were fully exposed to the actor's message, and 22.2% of those individuals replayed the actor's message. Risk visibility did not significantly affect exposure or replay. Participants who replayed the actor's message had higher risk recall ($M = 2.97$, $SE = 0.28$) than participants who did not ($M = 1.89$, $SE = 0.14$) $F(1, 377) = 11.84$, $p < .001$. They also thought the website placed less emphasis on benefits than risks ($M = 2.90$, $SE = 0.22$) than did those who did not replay the actor's message ($M = 3.79$, $SE = 0.15$), $F(1, 362) = 11.39$, $p < .001$. There were no other significant associations with replay.

Seasonal allergies—Participants in the actor condition spent longer on the homepage (101.90 seconds) than participants in the other format conditions (83.41 seconds), $F(1, 1780) = 11.59$, $p < .001$. Risk visibility did not affect time spent on the homepage. Most participants in the actor condition (92.5%) were fully exposed to the actor's message, and 18.8% of those individuals replayed the actor's message. Risk visibility affected replay (but not exposure), with more participants in the signal condition replaying the actor's message (25.6% vs. 11.4%), $\chi^2(1) = 12.07$, $p = .03$. Participants who replayed the actor's message had higher benefit recognition ($M = 6.66$, $SE = 0.18$) than participants who did not ($M = 6.14$, $SE = 0.15$), $F(1, 364) = 4.81$, $p = .03$. There were no other significant associations with replay.

Risk Retention and Perceived Risk—Format did not significantly affect risk recall, risk recognition, or either perceived risk measure in the high cholesterol and seasonal allergies samples, $p > .05$. Risk visibility had an effect on perceived risk likelihood in the high cholesterol sample, $F(1, 2036) = 5.42$, $p = .02$, with the website with no signal leading to greater perceived risk likelihood (untransformed $M = 24.78$, $SE = 1.16$) than the website with a signal (untransformed $M = 20.65$, $SE = 0.87$). No other effects of risk visibility or the interaction term were significant.

Benefit Retention

High cholesterol—Format affected benefit recall, $F(4, 2115) = 8.65$, $p < .001$. Participants in the actor condition recalled fewer benefits compared with those in the paragraph, bulleted list, checklist, and highlighted box conditions, $F(1, 805) = 10.96$, $p = .001$, $d = .23$; $F(1, 832) = 10.69$, $p = .001$, $d = .23$; $F(1, 835) = 16.36$, $p < .001$, $d = .28$; and $F(1, 777) = 30.99$, $p < .001$, $d = .40$, respectively. Risk visibility and the interaction term were not significant.

Format also affected benefit recognition, $F(4, 2115) = 4.55, p < .001$. Participants in the actor condition recognized fewer benefits compared with those in the bulleted list, checklist, and highlighted box conditions, $F(1, 832) = 12.33, p = .001, d = .25$; $F(1, 835) = 8.82, p = .003, d = .21$; and $F(1, 777) = 15.82, p < .001, d = .29$, respectively. The comparison with the paragraph condition was not significant. Risk visibility and the interaction term were not significant.

Seasonal allergies—Format, risk visibility, and their interaction did not significantly affect benefit recall or benefit recognition, $p > .05$.

Perceived Efficacy—Format, risk visibility, and their interaction did not significantly affect perceived efficacy in the high cholesterol or seasonal allergies samples, $p > .05$.

Risk-benefit Assessment

High cholesterol—Format affected participants' risk-benefit assessment of the drug, $F(4, 2067) = 4.47, p = .001$. Participants in the actor condition did not feel as strongly that the drug's benefits outweighed its risks compared with participants in the paragraph and highlighted box conditions, $F(1, 784) = 14.23, p < .001, d = .27$ and $F(1, 754) = 11.83, p < .001, d = .26$, respectively. Comparisons with the bulleted list and checklist were not significant. Risk visibility and the interaction term were not significant.

Seasonal allergies—Format, risk visibility, and their interaction did not influence risk-benefit assessment, $p > .05$.

Drug Attitudes

High cholesterol—Format affected participants' attitudes toward the drug, $F(4, 2068) = 2.57, p = .04$. Participants in the actor condition had less positive attitudes toward the drug compared with participants in the paragraph and highlighted box conditions, $F(1, 784) = 6.32, p = .012, d = .18$ and $F(1, 749) = 8.19, p = .004, d = .21$, respectively. The comparisons with the bulleted list and checklist were not significant. Risk visibility and the interaction term were not significant.

Seasonal allergies—Format affected participants' attitudes toward the drug, $F(4, 2082) = 2.46, p = .04$. None of the comparisons were significant; however, the pairwise comparison between the actor and paragraph conditions came close to significance, $F(1, 771) = 5.93, p = .015, d = .18$. In addition, risk visibility affected drug attitude, $F(4, 2082) = 4.80, p = .03$, with the website with no signal leading to more positive attitudes toward the drug ($M = 4.87, SE = 0.06$) than the website with a signal ($M = 4.68, SE = 0.06$). The interaction term was not significant.

Website Balance of Risk and Benefit Information

High cholesterol—Format affected perceived balance of risk and benefit information on the drug website, $F(4, 2059) = 5.18, p < .001$. Participants in the actor condition rated the website as placing less emphasis on benefits than risks compared with participants in the paragraph, bulleted list, checklist, and highlighted box conditions, $F(1, 780) = 10.42, p$

$= .001, d = .23; F(1, 808) = 11.48, p = .001, d = .24; F(1, 811) = 7.79, p = .005, d = .20$; and $F(1, 749) = 18.77, p < .001, d = .32$, respectively. The main effect was no longer significant when participants who replayed the actor's message were excluded, $F(4, 1972) = 2.35, p = .05$. Risk visibility and the interaction term were not significant.

Seasonal allergies—Format affected perceived balance of risk and benefit information on the drug website, $F(4, 2072) = 6.45, p < .001$. Participants in the actor condition rated the website as placing less emphasis on benefits than risks compared with participants in the paragraph, bulleted list, checklist, and highlighted box conditions, $F(1, 767) = 20.22, p < .001, d = .32; F(1, 804) = 17.19, p < .001, d = .30; F(1, 795) = 14.11, p < .001, d = .27$; and $F(1, 783) = 17.89, p < .001, d = .30$, respectively. Risk visibility and the interaction term were not significant.

Discussion

We examined the role of five formats for presenting risk information on prescription drug websites, including an actor that delivered risk information audibly. We found in samples from two different medical conditions that format did not influence risk information retention. Instead, we found that in many cases, an actor who communicated risk information influenced benefit-related outcomes, leading to lower retention of benefit information, perceptions of the drug and website as less tilted toward benefits, and a less positive attitude toward the drug overall. Although the finding that risk retention is not hampered by actors is reassuring, the decreased retention of benefit information does not appear advantageous.

Although our findings are in line with those of Davis (2010), our retention findings are in contrast to previous studies that showed higher retention in actor conditions than in text conditions (Mayer et al., 2003; Moreno, 2006; Moreno et al., 2001). In previous research, the “actors” were starkly different than the ones employed in our study. In many cases, these characters were drawn roughly (Mayer et al., 2003; Moreno et al., 2001, Studies 1–4); sometimes designed as cartoon characters (e.g., disembodied head, alien bug) and other times designed as a rudimentary human form (Craig et al., 2002). By contrast, the actor we used in this study was a human, filmed live and then embedded on the website. Thus, our actor more closely reflected a live-shot movie than an animated cartoon.

It is possible that the use of a live-action actor (rather than an animated character) explains the difference in findings. Although we believed that a walking, talking live-action actor would be more vivid than an animated character, it is possible that the non-human animation in previous studies caused greater attention due to novelty effects. Current web users may have found the floating actors on our websites to be indistinguishable from videos of actors. Videos, including those that pop-up automatically, are common on websites, perhaps diminishing the novelty of the actor in our study. This aligns with previous research demonstrating that novelty affects only short-term memory (Sheinin, Varki, & Ashley, 2011), which is what we captured in this study.

The actor effects on benefit outcomes may result from the fact that our actor began speaking about the risks as soon as the viewer arrived at the website. Because pretesting showed that few people clicked on the actor to begin her presentation, we made this intentional change to ensure that our participants saw the presentation. This may have stopped participants from reading the information on the website, which included the benefit information. We chose for the actor to only convey risk information because previous research has shown that benefits and risks are not presented equally on pharmaceutical websites (Huh & Cude, 2004) and that risk information is often lacking or mischaracterized (Kim, 2015). However, given that risk retention was not improved with the actor presentation, this immediate audio risk presentation does not appear to be a valid way to ensure benefits and risks are equally considered on a pharmaceutical website.

By design, we examined the issues in this paper in two distinct medical conditions to avoid the limitations of using only one condition. Nevertheless, it is possible that patients with different medical conditions may react differently to actors. We saw stronger findings in the high cholesterol sample, perhaps because seasonal allergy prescription medications tend to have fewer risks and because participants may not have spent as much time reviewing the risk information (Hoy & Levenshush, 2016). Examining these issues in additional medical conditions would elucidate these findings.

Moreover, the shorter duration of the seasonal allergies actor's role (53 seconds versus 85 seconds for high cholesterol) may have resulted in the weaker effects in this population. The length of the actor's presentation was directly tied to the risks of the drug product. We chose not to standardize length in order to capture the reality that different products have different risk profiles.

Finally, participants visited the websites only once within the context of an experimental study, and approximately 80% of participants viewed the actor only once. Consumers who visit websites when actively seeking treatment may view actors or be exposed to risk information multiple times and, therefore, may react differently.

There are three direct areas of future research that stem from this study. First, we did not test a benefits-only or a benefits-plus-risk condition. Our actor communicated only the risks. It is possible that viewers would respond to the actor differently if she mentioned the benefits as well. Second, we did not examine the role of visual or verbal learning preferences (Mayer & Massa, 2003) and how actors may cater to those preferences. Our actor condition was the only one that included an audio component to the risk information, and it is possible that individual visual or verbal learning preferences may explain why some studies found text superior to actors (Davis, 2010) and other studies found the opposite (Mayer et al., 2003; Moreno, 2006; Moreno et al., 2001). Third, our actor delivered one pre-recorded presentation, and future studies should examine more customized or interactive actors. Past research has found that people respond better to an interactive actor who explains questions in small doses rather than a continuous presentation (Mayer et al., 2003). Thus, future research can explore whether interactive actors are an appropriate or helpful source of prescription drug risk information.

Using a live-action actor floating on screen to describe the risks of a prescription drug may appear to be a promising new risk communication format. However, our study demonstrates that this format may not increase risk retention, but instead may disrupt the retention of benefit information and affect the resulting risk-benefit assessment, especially if the actor begins speaking immediately upon webpage viewing. From a public health and informed decision making perspective, ensuring that consumers understand both the benefits and risks of prescription drugs is paramount. Future research should explore formats that increase risk comprehension without reducing benefit comprehension.

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Tired of Seasonal Allergies?
Ask your doctor about GLISTELL.

If you start sniffing and sneezing when spring, summer, or fall arrives in your area, you may suffer from seasonal allergies, also known as hay fever or allergic rhinitis. GLISTELL (lorreladine) is a long-acting once-daily antihistamine combined with a decongestant. This time-released tablet can relieve the following common seasonal allergy symptoms: nasal congestion, runny nose; sneezing; itchy nose and throat; and watery, itchy, or red eyes.

What Does GLISTELL Do?

GLISTELL can relieve the symptoms of seasonal allergies such as runny nose; sneezing; itchy nose and throat; and watery, itchy, or red eyes.

What Risks Are Associated with GLISTELL?

A very serious allergic reaction to GLISTELL is rare. Seek immediate medical attention if you notice symptoms of a serious allergic reaction, such as a rash, severe dizziness, trouble breathing, or itching or swelling (especially around your face, tongue, or throat).

Do not give GLISTELL to children younger than two years old unless directed to by your doctor.

As a precaution, talk to your doctor before taking GLISTELL if you have high blood pressure, an overactive thyroid, or an enlarged prostate. People with these conditions may need different doses of GLISTELL.

GLISTELL can make it difficult to concentrate. Do not drive, use machinery, or do any activity that requires concentration until you are sure you can perform these types of activities safely.

Who Can Take GLISTELL?

GLISTELL is prescribed for individuals who suffer from seasonal allergies and have symptoms such as nasal congestion; runny nose; sneezing; itchy nose and throat; and watery, itchy, or red eyes.

Do not use this medication in children younger than two years of age unless directed by your doctor.

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Figure 1.
Seasonal allergies risk presentation for the actor condition.

Table 1Participant characteristics: weighted number (%)[/]

	High Cholesterol Sample	Seasonal Allergies Sample
Self-reported diagnosis	2,119 (100%)	2,115 (100%)
Sex		
Male	1060 (50%)	740 (35%)
Female	1059 (50%)	1375 (65%)
Race		
White	1764 (83.3%)	1694 (80.1%)
Black	184 (8.7%)	220 (10.4%)
Other	171 (8.1%)	201 (9.5%)
Ethnicity		
Hispanic	1959 (7.5%)	230 (10.9%)
Not Hispanic	160 (92.5%)	2996 (89.1%)
Education		
Less than high school	83 (3.9%)	78 (3.7%)
High school degree	767 (36.2%)	604 (28.6%)
Some college	610 (28.8%)	664 (31.4%)
Bachelor's degree or higher	659 (31.1%)	769 (36.4%)
Age		
18–34	52 (2.4%)	343 (16.2%)
35–44	169 (8.0%)	437 (20.6%)
45–54	309 (14.6%)	451 (21.3%)
55–64	725 (34.2%)	459 (21.7%)
65+	864 (40.8%)	425 (20.1%)

[/]Participant demographics are generally consistent with those of U.S. adults with these medical conditions in terms of sex, race, and age (National Center for Health Statistics, 2015; National Center for Health Statistics, 2014).

Table 2

Weighted means (standard errors) by risk information format condition in the high cholesterol sample.

	Paragraph	Bulleted list	Checklist	Highlighted box	Actor
N	428	455	457	401	378
Risk recall	2.08 (0.13)	2.18 (0.1)	2.29 (0.11)	2.13 (0.12)	2.13 (0.13)
Risk recognition	5.61 (0.12)	5.64 (0.12)	5.55 (0.14)	5.50 (0.13)	5.42 (0.14)
Perceived risk likelihood	23.31 (1.79)	22.29 (1.42)	23.11 (1.77)	22.11 (1.47)	22.55 (1.68)
Perceived risk magnitude	3.85 (0.09)	3.79 (0.09)	3.88 (0.09)	3.76 (0.09)	4.01 (0.08)
Benefit recall	1.22 [*] (0.06)	1.20 [*] (0.06)	1.28 [*] (0.06)	1.46 [*] (0.07)	0.93 (0.06)
Benefit recognition	6.37 (0.12)	6.58 [*] (0.11)	6.52 [*] (0.13)	6.69 [*] (0.12)	5.92 (0.15)
Perceived efficacy likelihood	65.17 (2.11)	66.55 (1.90)	69.51 (1.71)	68.76 (1.95)	64.33 (1.93)
Perceived efficacy magnitude	4.61 (0.09)	4.70 (0.06)	4.62 (0.07)	4.66 (0.08)	4.52 (0.07)
Risk-benefit assessment	4.72 [*] (0.09)	4.53 (0.08)	4.54 (0.09)	4.72 [*] (0.10)	4.23 (0.09)
Drug attitude	4.48 [*] (0.09)	4.47 (0.09)	4.48 (0.10)	4.53 [*] (0.09)	4.15 (0.10)
Website balance	4.13 [*] (0.11)	4.14 [*] (0.10)	4.05 [*] (0.10)	4.29 [*] (0.10)	3.58 (0.13)

Note. Measures were assessed on the following scales: risk recall = 0–12; risk recognition and benefit recognition = 0–8 correct; perceived risk likelihood and perceived efficacy likelihood = 0–100 people; perceived risk magnitude = 1 (*not at all serious*) to 6 (*very serious*); risk-benefit assessment = 1 (*risks outweigh benefits*) to 7 (*benefits outweigh risks*); benefit recall = 0–3; perceived efficacy magnitude = 1 (*would eliminate very few symptoms*) to 6 (*would eliminate all symptoms*); drug attitude = 1 (*bad*) to 7 (*good*); website balance = 1 (*more emphasis on risks*) to 7 (*more emphasis on benefits*). Although transformation of perceived risk and efficacy likelihood were used in analyses, we present untransformed weighed means for ease of interpretation.

^{*} = significantly different from the actor condition, $p < .0125$.

Table 3

Weighted means (standard errors) by risk information format condition in the seasonal allergies sample.

	Paragraph	Bulleted list	Checklist	Highlighted box	Actor
N	417	455	446	432	365
Risk recall	1.76 (0.11)	1.66 (0.10)	1.53 (0.11)	1.42 (0.11)	1.66 (0.11)
Risk recognition	5.76 (0.14)	5.50 (0.12)	5.67 (0.13)	5.59 (0.12)	5.71 (0.12)
Perceived risk likelihood	16.39 (1.62)	15.41 (1.21)	17.16 (1.39)	14.55 (1.39)	17.60 (2.00)
Perceived risk magnitude	3.29 (0.12)	3.38 (0.09)	3.31 (0.09)	3.36 (0.12)	3.57 (0.12)
Benefit recall	2.09 (0.12)	1.96 (0.11)	2.04 (0.11)	1.99 (0.12)	1.69 (0.11)
Benefit recognition	6.58 (0.10)	6.41 (0.12)	6.35 (0.10)	6.28 (0.15)	6.24 (0.13)
Perceived efficacy likelihood	71.59 (2.02)	71.61 (1.99)	70.71 (1.78)	74.41 (1.67)	72.99 (2.15)
Perceived efficacy magnitude	4.44 (0.09)	4.43 (0.08)	4.49 (0.06)	4.46 (0.07)	4.50 (0.07)
Risk-benefit assessment	4.97 (0.10)	4.81 (0.11)	4.97 (0.08)	4.91 (0.12)	4.81 (0.12)
Drug attitude	4.96 (0.09)	4.62 (0.10)	4.78 (0.09)	4.87 (0.10)	4.61 (0.11)
Website balance	4.71 [*] (0.14)	4.52 [*] (0.09)	4.53 [*] (0.12)	4.65 [*] (0.14)	3.80 (0.15)

Note. Measures were assessed on the following scales: risk recall = 0–10; risk recognition and benefit recognition = 0–8 correct; perceived risk likelihood and perceived efficacy likelihood = 0–100 people; perceived risk magnitude = 1 (*not at all serious*) to 6 (*very serious*); risk-benefit assessment = 1 (*risks outweigh benefits*) to 7 (*benefits outweigh risks*); benefit recall = 0–7; perceived efficacy magnitude = 1 (*would eliminate very few symptoms*) to 6 (*would eliminate all symptoms*); drug attitude = 1 (*bad*) to 7 (*good*); website balance = 1 (*more emphasis on risks*) to 7 (*more emphasis on benefits*). Although transformation of perceived risk and efficacy likelihood were used in analyses, we present untransformed weighed means for ease of interpretation.

^{*} = significantly different from the actor condition, $p < .0125$.