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Consumers' Optimism Bias and Responses to Risk Disclosures in Direct-to-Consumer (DTC) Prescription Drug Advertising: The Moderating Role of Subjective Health Literacy

Despite a substantial body of research in direct-to-consumer advertising (DTCA) for prescription drugs, what is missing from the existing discussion on the risk disclosure in DTCA is a focus on the roles of individual motivation and ability to process risk information. Guided by the Elaboration Likelihood Model (ELM) and the Motivation-Ability-Opportunity framework, the current study examines the roles of the consumer's optimism bias and subjective health literacy in responding to the risk disclosure in DTCA. By analyzing survey data ($N = 404$), the study reveals that: (1) consumers who show a tendency to believe that they are at less risk of experiencing adverse reactions to prescription drugs than their peers are less likely to pay attention to the risk disclosure or intend to seek further information about the health risks of drugs, (2) the relationship between optimism bias and information-seeking intentions is stronger for consumers with high subjective health literacy than for those with low health literacy. Implications and recommendations are provided.

In the United States, direct-to-consumer advertising (DTCA) for prescription drugs represents one of the fastest growing forms of pharmaceutical marketing (Liang and Mackey 2011). The expenditure on DTCA increased over fivefold from around \$800 million in 1996 to \$4.8 billion in 2008 (Thaul 2009). In 2008, DTCA was one of the biggest ad spending groups following automobiles (Nielsen Company 2009), although the expenditure slipped to \$4.1 billion in 2010 because of the economic recession (TNS Media Intelligence 2011).

One of the main objectives of DTCA is to inform and educate consumers about prescription drugs. Since the 1990s, drug manufacturers have turned their marketing attention from physicians to consumers (IMS Health 2003). The increasing commitment to DTCA has elevated

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consumer awareness of drug advertising and interest in DTCA-promoted drugs and health conditions (Huh, DeLorme, and Reid 2005). Gregory J. Glover, representative of the Pharmaceutical Research and Manufacturers of America, testified in a congressional hearing that “Drug companies rely on DTC advertising to stimulate demand and to increase sales for the products” (Prescription Drug Issues 2001, 5). There is much evidence that frequent exposure to DTCA is positively associated with consumers’ attention to, and desire for, the advertised drug (Kravitz et al. 2005).

Another important goal of DTCA is to persuade consumers to talk more about drugs with health professionals because patients need a doctor’s prescription to purchase a DTCA-promoted drug. There is evidence that this “pull” tactic to empower consumers has been effective. For instance, research shows that doctors are more likely to be asked to prescribe the advertised drug by consumers who are engaged with DTCA than by those less involved (Kaiser Family Foundation 2001). Consumers tend to actively talk to physicians to request advertised drugs (Kravitz et al. 2005) and do not easily give up until they obtain the requested drug (Davis 2000). The fact that DTCA is designed to promote shared decision making between consumers and doctors is a unique characteristic of prescription drugs as a product category (Huh and Becker 2005; Menon et al. 2003).

Researchers, policymakers and health professionals tend to have strong opinions about the social value of DTCA. Proponents point out that DTCA provides valuable medical information, motivates consumers to actively interact with physicians, educates individuals about health conditions and treatment options, and helps reduce costs of prescription drugs (for a review, see Cox and Cox 2010). On the other hand, opponents argue that DTCA leads consumers to seek unnecessary drugs and therefore inflates health care costs, induces people to ignore alternative treatment options, and negatively affects the doctor–patient interaction. They further argue that the complex medical information and unbalanced presentation between promotional messages and risk information in DTCA could engender misperceptions about drugs, which may result in requests for unnecessary drugs (for a review, see Frosch et al. 2010).

RISK DISCLOSURE AND THE “FAIR BALANCE” POLICY

Inappropriate use of prescription drugs may lead consumers to experience serious consequences for their health. Therefore, since the late 1980s when pharmaceutical companies started advertising prescription drugs directly to consumers, DTCA has been required by the Food and

Drug Administration (FDA) to include risk information (FDA 1999). That is, in addition to information about the drug's health benefits, the mandatory risk disclosure in DTCA presents the medicine's major health risks and side effects. The disclosure is presented as a brief summary for print ads or major statements coupled with adequate provision for broadcast ads (FDA 2009).

The FDA requires that DTCA containing a promotional message should keep a *fair balance* between the amounts of benefits and risks presented (Aikin et al. 2011). This also signifies that the content and presentation of a drug's most important risks must be as salient as the presentation of its benefits. The FDA further emphasizes that the presentation of the drug's risks and benefits must be "understandable, accurate, and up-to-date" (Thaul 2009, 2). Accordingly, in 2005 Pharmaceutical Research and Manufacturers of America introduced self-regulatory guidelines for DTCA focusing on the principles of "education, information, clarity, and balance" (Royne and Myers 2008, 64), with the purpose of protecting consumers from being misled or confused by DTCA information.

Despite these efforts, however, health professionals and researchers have found that DTCA frequently violates the FDA guidelines, and have expressed concerns about its potential impact on consumer health (Kaphingst and DeJong 2004; Royne and Myers 2008; Wogalter, Dejoy, and Laughery 1999). For example, researchers found that benefit information in print DTCA was substantially more prominent than risk-related information (Lexchin and Mintzes 2002). In addition, although the FDA recommends using audience-friendly language, studies report that the textual information in DTCA is too technical and complex for the general public to understand (Kaphingst and DeJong 2004). Sheehan (2006) suggests that these practices can attenuate the accessibility of risk information and as a result can mislead consumers to believe that the advertised drug is less harmful than it is. This is highly undesirable, as consumer health decisions may be based on such misperceptions (Mackert 2011).

Research supports the perspective that message tactics could affect consumer perception of the drug's health risks. For example, Davis (2000) examined the relationship between the completeness of risk information presentation in DTCA and consumer response to the advertised drug. The study found that consumers rated drug ads with incomplete risk information more positively than those with complete presentation. In a similar vein, Hoek and Maubach (2007) found that mechanical features in presenting risk information produced substantial variances in consumers'

knowledge and attitudes about the prescription drug, and the likelihood that they would recall the drug's health risks. Aikin et al. (2011) further found that formats of risk presentation in DTCA influenced consumer understanding of the brief summary.

It is important to note that the regulatory requirement to include the risk disclosure in DTCA is based on the assumption that consumers are likely to have adequate ability to understand risk information and take it into consideration in making health decisions (Calfee 2002). In this regard, researchers note that "many models of health care decision making can be classified as expectancy models, which imply that consumers are rational in their decision making and use a version of weighted sum model to process and use available information" (Cox, Cox, and Mantel 2010, 31). However, consumers are not always rational in making decisions, and motivation and ability to process information could vary across individuals or demographic segments (Cacioppo and Petty 1984). The idea that individual differences in motivation and ability could influence consumer processing and understanding of risk information in DTCA has yet to be tested.

STUDY OBJECTIVES

Despite a substantial body of research, what is missing from the existing literature on DTCA risk disclosure is a focus on the roles of consumers' individual characteristics such as differences in motivation and ability to process health messages in accounting for their response to risk information. The primary purpose of the current study is to examine if consumers' response to the DTCA risk disclosure is shaped by the extent of optimism bias they have about the likelihood of experiencing adverse reactions of prescription drugs. In the health context, optimism bias is a tendency for people to mistakenly believe that they have lower chances of experiencing a negative event related to their health compared with their peers (Weinstein 1980). Research suggests that this optimism bias could lower intentions for addressing health problems (Sheer and Cline 1994). However, little attention has been paid to how this optimism bias affects consumer response to the risk disclosure in DTCA.

This study will investigate whether the degree of optimism bias relates to consumers' attention to, and perceived importance of, the risk disclosure and intentions to seek more risk information through alternative sources. Further, although An and Muturi (2011) suggest that subjective health literacy is one of the important factors shaping consumers' response to DTCA, there is a paucity of research on how

it affects their assessment of risk information. Therefore, a second objective of the study is to examine whether the relationship between optimism bias and response to the disclosure is moderated by subjective health literacy. Examining the roles of these two important constructs in shaping consumer response to the DTCA risk disclosure will produce insight for professionals and policymakers regarding how to enhance the communication of health risks in the increasingly important advertising category.

THEORETICAL FRAMEWORK

Optimism Bias as Motivation to Process Risk Disclosure

Optimism bias is observed across a wide range of judgment domains, such as health behavior (Sheer and Cline 1994), risk communication (Salmon, Park, and Wrigley 2003), organizational behavior (Klein and Kunda 1994), and social estimates regarding crimes (Perloff and Fetzer 1986). In the DTCA context, consumers' willingness to process the risk disclosure will likely depend on the individual's optimism bias about the probability of experiencing the drug's adverse reactions, because such bias could shape their motivation to process risk information (Taylor and Brown 1988). Research shows that people who are overconfident in evaluating their health are less likely to perceive health risks to be personally relevant and therefore will have lower motivation to process relevant information (Jaccard, Dodge, and Guilamo-Ramos 2005).

Motivation is defined as "heightening arousal" with the result that "inactive audiences are ready, willing, interested, or desire to process a message" (Hallahan 2000, 466). The individual's motivation for information processing predicts the level of cognitive elaboration for a persuasive message (Petty, Cacioppo, and Schumann 1983). As an inner state of willingness to acquire or dispose of information, motivation serves as an activator of a goal-relevant behavior. Hence, consumers who have high motivation to achieve a goal (e.g., treating a disease with minimum risks) are likely to devote more efforts to process the ad, pay more attention to information in the ad and are more willing to comprehend and evaluate it analytically. In contrast, the state of low motivation can prevent consumers from being willing to engage in a goal-relevant activity (Roberts and Maccoby 1973). Many researchers have found that processing motivation is a predictor of attention to information (Hallahan 2000; Petty and Cacioppo 1984).

From the discussion above, it is expected that consumers with a strong optimism bias about the likelihood of experiencing negative outcomes of

using advertised prescription drugs will have relatively low motivation to process information in the risk disclosure. In the absence of an information processing goal, those with high optimism bias will believe that the drug's potential risks are insignificant and irrelevant, and as a result are not likely to pay attention to the risk information or seek further information about such risks. In contrast, consumers with low optimism bias about the drug's risks will respond to the risk disclosure more actively.

Research provides support for the above perspective regarding the consequences of high optimism bias. For example, Weinstein (1989) found that people who perceived that they had a lower risk of having a certain disease than their peers tended to be less willing to seek preventive or remedial behaviors, implying that self-positivity mitigates health behaviors. In the context of DTCA, Park, Ju, and Kim (2013) found that as consumers were more optimistically biased about the risk of experiencing clinical depression in the future, they were less likely to seek information about its medical conditions and treatment options. Based on this body of research, the following hypothesis is raised.

H1: Compared with those with higher optimism bias, consumers with a lower level of optimism bias about the likelihood of experiencing adverse reactions of prescription drugs: (a) are more likely to pay attention to the risk disclosure in DTCA, (b) are more likely to perceive that reading the risk disclosure is important, and (c) report stronger intentions to seek further risk information through alternative sources.

Subjective Health Literacy

The expectation that optimism bias could influence consumer response to risk information engenders the need to examine factors that may facilitate or inhibit such a relationship. This is because identifying such factors will contribute to understanding how consumers with various characteristics process the risk disclosure in DTCA differently. A substantial amount of research (Batra and Ray 1986; Petty and Cacioppo 1984) proposes that differences in the degree to which one is able to process information appropriately could adjust the magnitude of the relationship between motivation and goal-relevant behaviors. Among many variables that potentially tap into the overarching construct of ability, the present study focuses on the moderating role of subjective health literacy.

Health literacy is defined as "the degree to which individuals have the ability to obtain, process, and understand basic health information and

services needed to make appropriate health decisions” (Nielsen-Bohlman, Panzer, and Kindig 2004, 2). Of particular interest in this study is to examine the role of individuals’ subjective health literacy, defined as how individuals perceive their ability to understand and use medical information, in shaping their processing of the risk disclosure in DTCA, as subjective perception is an important predictor of health behavioral intentions (An 2007; Rock et al. 2005).

Optimism Bias and Subjective Health Literacy

The motivation, ability, and opportunity (MAO) framework posits that consumers’ motivation and ability are antecedents to processing advertising information (Batra and Ray 1986; MacInnis, Moorman, and Jaworski 1991). Ability is defined as consumers’ skills or proficiencies in interpreting a message (MacInnis and Jaworski 1989). Regarding the role of ability as a moderator, the MAO framework suggests that while one’s motivation is a driving force of behavior, it cannot lead to action when ability is low (Cummings and Schwab 1973). In a similar vein, MacInnis and Jaworski (1989) propose that the effects of motivation on cognitive elaboration are moderated by processing ability.

The Elaboration Likelihood Model (ELM) also offers an account for ability as a moderator. The perspective posits that ability and motivation interactively determine the level of cognitive elaboration on persuasive messages (Petty, Cacioppo, and Schumann 1983). That is, if consumers are both motivated and able to comprehend a given message, they are more likely to elaborate upon it. If consumers are motivated but unable to process a message, then consumers are less likely to elaborate on the central message elements and are subject to the influences of peripheral cues (Cacioppo and Petty 1984). In support of the MAO and ELM perspectives, Andrews (1988) showed that consumers reported a high level of attention to and better comprehension of advertisements when their knowledge and ability were both high, and processing of main arguments in the ad significantly decreased when either one was lacking.

The above frameworks suggest that subjective health literacy, a concept in the health behavior literature tapping into the overarching construct of information processing ability in the ELM and MAO frameworks, would be a moderator of the effects of motivation on response to health information. Young and Cline (2005) suggest that health literacy is a prerequisite for consumers to comprehend the medical content of ads. Further, An and Muturi (2011) examined the role of subjective health literacy in accounting for consumer response to DTCA.

The study revealed that those with low subjective health literacy tended to evaluate negatively the effectiveness of DTCA in delivering key medical information, which implies that low ability would be a barrier to consumer processing of risk information even when motivation is reasonably high.

Based on the literature, it is expected that subjective health literacy would moderate the potential effects of optimism bias on consumer response to the risk disclosure in DTCA. That is, low optimism bias (i.e., high motivation to process the risk disclosure) would lead to increased attention to the risk disclosure, higher likelihood of perceiving that the disclosure is important, and stronger intentions to search further information, and these relationships will be stronger among those with high subjective health literacy than among those with low health literacy. To examine this idea, the following hypothesis is raised.

H2: Optimism bias about the likelihood of experiencing adverse reactions to prescription drugs and subjective health literacy will have an interaction on responses to the risk disclosure in DTCA, such that the associations between optimism bias and the dependent variables will be more negative when the level of subjective health literacy is high than when health literacy is low.

METHOD

Sample

To recruit respondents from various demographic backgrounds at moderate cost, a survey was conducted through an online consumer research panel. A convenience sample of 412 US consumers who had used prescription medicine was initially obtained from Zoomerang.com, a market research company specializing in online surveys. Four responses were removed because over 10% of the questionnaire items were not completed, resulting in a sample of 408 respondents. Multiple regressions were used to test the proposed hypotheses. Before interpreting the main results, outliers and influential cases were examined to meet the statistical assumptions of regression. The case-wise diagnostics identified four cases with standardized residual values over 3. Also, these four cases were judged as influential, with the Cook's distance values greater than .0098 (i.e., 4/sample size). These four cases were also pulled out of the sample, resulting in the final sample size of 404.

The sample contained individuals from diverse demographic backgrounds. Respondents' age ranged from 37 to 85 ($M = 58$ and $SD = 10.9$). In terms of age distribution, 59.4% were mature adults (45 to 64), followed by older adults (65 or older, 31.2%) and younger adults (37 to 44,

9.4%). The sample had more men (55.4%) than women (44.6%). The majority were whites (92.3%), followed by Asians (3.5%) and African Americans (2.2%). A total of 238 (62.8%) respondents reported an annual household income of \$25,000 to \$99,999, 15.0% reported \$24,999 or less and 22.2% reported \$100,000 or more. In terms of educational level, the majority (83.2%) reported having at least some college education whereas only four (1%) respondents did not finish high school, indicating that the sample overrepresents the highly educated. Because highly educated individuals may have a higher propensity and greater ability to understand a disclosure, it should be noted that the overrepresentation of such individuals might affect the results of this study.

Procedure

A recruiting email was sent to members of Zoomerang.com's research panel. The members were invited to click the URL and log on to the survey. The questionnaire began with an explanation of "prescription drugs" compared to over-the-counter drugs and provided examples of prescription medicines. Those who had never taken a prescription drug were screened out. Before measuring variables related to the risk disclosure, respondents were exposed to two pages of benefit claims for a prescription drug ad, and two sample brief summaries of the drug's adverse reactions. Each image was inserted in a small size, but respondents could zoom in by clicking it. Then the survey proceeded in the order of measuring the two independent variables (optimism bias and subjective health literacy), the dependent variables (attention to the risk disclosure, perceived importance of the disclosure in making drug-related decisions, and intentions to seek more risk information about the drug's adverse reactions) and control variables.

Measures

Optimism Bias

On a two-item, 7-point scale (1 = *far less likely*, 4 = *about the same likelihood* and 7 = *far more likely*), respondents rated their perceived likelihood of experiencing major health risks and minor side effects from prescription drugs compared to their peers (Weinstein 1987). For minor side effects, respondents checked the scale for the following statement: "Imagine that you take a prescription drug that you haven't tried yet, and saw advertised in a magazine. Compared with other people your age and gender, how would you rate your chances of experiencing

minor side effects (such as drowsiness, dizziness, sleeping problems, minor fever, trouble swallowing, or itchiness) after taking the prescription drug?" The item for major health risks replaced side effects with serious adverse reactions such as respiratory tract infection, blurred vision, liver abnormalities, uncontrollable muscle movement, heart diseases, and thoughts of suicide.

The two items were reverse-coded, such that a high rating represents stronger optimism bias. The items were highly correlated ($r = .65$ and $p < .01$), and were averaged to obtain a single index of optimism bias ($\alpha = .75$). A one-sample t -test shows that the mean rating on the single measure ($M = 4.40$ and $SD = 1.16$) was significantly higher than the midpoint of the scale, $t(403) = 7.01$, $p < .01$, implying that respondents were optimistically biased on the average. To assess the magnitude of optimism bias, the t -statistic was converted into an r -value (Rosenthal 1991). The computed r -value of .33 indicated a moderate effect size (Cohen 1988).

Subjective Health Literacy

Respondents reported their subjective health literacy by completing a seven-item, 5-point scale (Chew, Bradley, and Boyko 2004). Items were reverse-coded where necessary, such that a high rating represents high subjective health literacy. Anchors of the scale differed across items (e.g., 1 = *never*, 3 = *sometimes* and 5 = *always* for "how often are appointment slips written in a way that is easy to read and understand?" and "how often are medical forms difficult to understand and fill out?" and 1 = *not at all*, 3 = *somewhat* and 5 = *extremely* for "how confident are you filling out medical forms by yourself?" and "how confident do you feel in following the instructions on the label of a medication bottle?"). Therefore, the seven items were standardized and averaged to obtain a single index ($M = .00$, $SD = .68$ and $\alpha = .80$).

Dependent and Control Variables

Respondents checked a 7-point scale (1 = *not at all likely* and 7 = *very likely*) for the following question (Menon et al. 2003): "Imagine that you have a health problem and are reading a magazine ad for a prescription drug that treats the health problem, and you haven't tried it yet. How likely would you be to read the brief summary pages of the ad?" ($M = 4.63$ and $SD = 2.03$). Then respondents rated on a 4-point scale (1 = *not important at all* and 4 = *very important*) the importance of reading the brief summary pages when they see a DTC ad (Delorme, Huh, and Reid 2009). The mean importance rating was 3.04 ($SD = .96$).

On a 7-point scale (1 = *strongly disagree*, 4 = *neither agree nor disagree* and 7 = *strongly agree*), respondents rated the following statements, "I would like to learn more about the health risks and side effects of the drug," "When I come across other useful information about the health risks and side effects of the drug, I would like to retain it," and "I would like to use various alternative sources to get more information about the drug's health risks and side effects" (Huh, Delorme, and Reid 2005). The items were averaged to obtain a single index of information-seeking intentions ($M = 5.50$, $SD = 1.17$ and $\alpha = .83$). Last, several covariates identified in the DTCA literature (DeLorme and Huh 2009) were also measured, such as skepticism toward DTCA ($M = 3.20$, $SD = .88$ and $\alpha = .95$), familiarity with DTCA ($M = 3.11$, $SD = 1.47$ and $\alpha = .90$), and prior exposure to DTCA ($M = 3.44$, $SD = 1.42$ and $\alpha = .86$).

RESULTS

In order to investigate the two hypotheses, a set of hierarchical multiple regressions were conducted. Demographic variables such as gender, age, education, and household income were entered in Block 1. The other three covariates, skepticism, exposure and familiarity with DTCA, were entered in Block 2. In Block 3, optimism bias and subjective health literacy were entered. Last, in Block 4, the interaction between optimism bias and subjective health literacy was entered. Prior to computing the interaction term, the two variables were mean-centered to reduce multicollinearity (Aiken and West 1991). The three dependent variables were all significantly correlated with each other ($r = .53$, $p < .01$ between attention and intentions; $r = .54$, $p < .01$ between importance and intentions; $r = .74$, $p < .01$ between attention and importance). Also, multiple R s for regressions were statistically significant across all dependent variables. The results of the regressions are summarized in Tables 1–3.

H1 predicted that optimism bias would be negatively associated with: (a) attention to the risk disclosure in DTCA, (b) perceived importance of reading the disclosure, and (c) intentions to seek further information about the drug's health risks through alternative sources. The results indicate that overall, optimism bias contributes significantly to the prediction of all three dependent variables. First, the results show that optimism bias tends to reduce the level of attention to the risk disclosure (Table 1), as a higher degree of optimism bias is associated with lower attention to DTCA's risk disclosure ($\beta = -.12$ and $p < .05$). This supports H1a. Second, as Table 2 shows, optimism bias is also negatively associated

TABLE 1
Hierarchical Regression for Attention to the DTCA Risk Disclosure

| Predictors | Statistics | | | | |
|---|------------|-----|---------|--------------------|------------------|
| | B | SE | β | Block ΔR^2 | Block ΔF |
| Block 1 | | | | .03* | 3.01* |
| Gender | .51 | .20 | .13* | | |
| Age | .01 | .01 | .07 | | |
| Education | -.06 | .08 | -.04 | | |
| Household income | .04 | .04 | .06 | | |
| Block 2 | | | | .06** | 8.43** |
| Skepticism toward DTCA | -.12 | .11 | -.05 | | |
| Exposure to DTCA | .11 | .10 | .08 | | |
| Familiarity with DTCA | .23 | .10 | .16* | | |
| Block 3 | | | | .01 | 2.94 |
| Subjective health literacy | .16 | .16 | .05 | | |
| Optimism bias | -.21 | .09 | -.12* | | |
| Block 4 | | | | .00 | .36 |
| Subjective health literacy \times optimism bias | -.11 | .12 | -.05 | | |

* $p < .05$ (two-tailed), ** $p < .01$ (two-tailed), adjusted $R^2 = .08$ ($N = 404$).

with the personal importance of reading the risk disclosure ($\beta = -.11$ and $p < .05$). Therefore, H1b is also supported. Last, also in support of H1c, optimism bias is negatively related to intentions to seek more information about the health risks of prescription drugs ($\beta = -.15$, $p < .01$; Table 3).

H2 predicted that optimism bias about the likelihood of experiencing adverse reactions and subjective health literacy would interact to shape responses to the risk disclosure, such that the association between optimism bias and dependent variables would be more negative as consumers' level of subjective health literacy increased. In our study, optimism bias and subjective health literacy do not have a significant interaction on perceived attention to the risk disclosure (H2a; Table 1) and perceived importance of reading the disclosure (H2b; Table 2). In contrast, they have a significant interaction ($\beta = -.10$ and $p < .05$) on intentions to seek additional risk information through alternative sources (H2c; and Table 3). The negative coefficient suggests that the contribution of optimism bias to intentions for information seeking turns more negative as respondents' subjective health literacy increases. This pattern supports H2c.

To further illustrate how the interaction unfolds, a simple slope test was conducted. This analysis explains whether a relationship between two variables is statistically different from zero at different levels of

TABLE 2

Hierarchical Regression for the Importance of Reading the DTCA Risk Disclosure

| Predictors | Statistics | | | | |
|---|------------|-----|---------|--------------------|------------------|
| | B | SE | β | Block ΔR^2 | Block ΔF |
| Block 1 | | | | .04** | 4.22** |
| Gender | .31 | .09 | .16** | | |
| Age | .01 | .00 | .09 | | |
| Education | .02 | .04 | .03 | | |
| Household income | .02 | .02 | .04 | | |
| Block 2 | | | | .07** | 10.26** |
| Skepticism toward DTCA | -.14 | .05 | -.13** | | |
| Exposure to DTCA | .01 | .05 | .02 | | |
| Familiarity with DTCA | .13 | .05 | .19** | | |
| Block 3 | | | | .01 | 2.73 |
| Subjective health literacy | .10 | .08 | .07 | | |
| Optimism bias | -.09 | .04 | -.11** | | |
| Block 4 | | | | .00 | .35 |
| Subjective health literacy \times optimism bias | -.03 | .06 | -.03 | | |

* $p < .05$ (two-tailed), ** $p < .01$ (two-tailed), adjusted $R^2 = .10$ ($N = 404$).

a third variable (Aiken and West 1991). Figure 1 portrays the pattern of the interaction. The results reveal that the relationship between optimism bias and information-seeking intentions is negative when subjective health literacy is high, corresponding to one standard deviation above the mean subjective health literacy, $\beta = -.24$, $t(400) = -3.86$ and $p < .01$. The slope is also negative at the average level of literacy, $\beta = -.15$, $t(400) = -3.38$ and $p < .01$. In contrast, the relationship is not significantly different from zero, $\beta = -.09$, $t(400) = -3.38$ and $p = .35$ when subjective health literacy is low, defined as one standard deviation below its mean level. This further supports the prediction that the relationship between optimism bias and information-seeking intentions would be more negative as subjective health literacy increases.

DISCUSSION OF FINDINGS

Because DTCA is designed to promote shared decision making between consumers and doctors (Huh and Becker 2005), it is critical that consumers are adequately informed about the positive and negative aspects of a prescription drug they consider as a treatment option for a health condition. Therefore, an important research agenda is to examine how consumer response to risk information is shaped by individual

TABLE 3
Hierarchical Regression for Information-Seeking Intentions

| Predictors | Statistics | | | | |
|---|------------|-----|---------|--------------------|------------------|
| | B | SE | β | Block ΔR^2 | Block ΔF |
| Block 1 | | | | .06** | 6.22** |
| Gender | .44 | .11 | .19** | | |
| Age | .01 | .01 | .06 | | |
| Education | -.05 | .05 | -.05 | | |
| Household income | .03 | .02 | .06 | | |
| Block 2 | | | | .06** | 8.20** |
| Skepticism toward DTCA | .16 | .06 | .09 | | |
| Exposure to DTCA | .10 | .06 | .12 | | |
| Familiarity with DTCA | .10 | .06 | .13 | | |
| Block 3 | | | | .03** | 7.81** |
| Subjective health literacy | .24 | .09 | .13** | | |
| Optimism bias | -.15 | .05 | -.15** | | |
| Block 4 | | | | .01* | 4.22* |
| Subjective health literacy \times optimism bias | -.14 | .07 | -.10* | | |

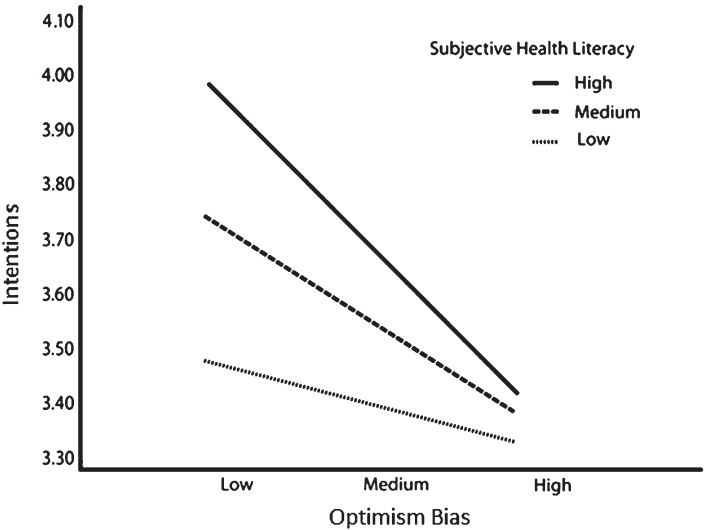
* $p < .05$ (two-tailed), ** $p < .01$ (two-tailed), adjusted $R^2 = .14$ ($N = 404$).

characteristics such as motivation and ability to understand health messages. While the social psychology literature has confirmed optimism bias in a variety of areas, to the best of the authors' knowledge, the current research is the first empirical study incorporating the concept in the context of DTCA's risk disclosure.

Additionally, the current study revealed the role of subjective health literacy in moderating the effects of optimism bias on consumers' information-seeking intentions regarding the health risks of prescription drugs. That is, the higher subjective health literacy was, the stronger the negative relationship between optimism bias and information-seeking intentions. This finding contributes to expanding our understanding of how consumers with varying levels of motivation and ability process the DTCA disclosure differently.

The current study shows that optimism bias is an important determinant of the consumer's response to the risk disclosure in DTCA. This implies that to encourage consumers to read the risk disclosure, which is valuable in making informed and balanced health decisions, a DTC ad should alleviate the extent of optimism bias. One may argue that as an inherent characteristic of consumers, optimism bias cannot be modified. However, a body of theoretical perspectives and research propose that

FIGURE 1
Interaction of Optimism Bias and Subjective Health Literacy



even if one’s optimism bias cannot be eradicated altogether, its strength may be reduced.

For example, Ranby et al. (2010) propose that an information source can reduce the strength of an individual’s optimism bias to the extent that it has differential impact on its two underlying conceptual components in risk estimation: personal (i.e., perception of one’s own risk) and general (i.e., perception of general others’ risk). Building upon this idea, Park, Ju, and Kim (2013) found that cumulative exposure to DTCA for antidepressants had the potential to influence the extent of optimism bias about the future risk of depression. In addition, research shows that the extent of optimism bias is shaped by a range of health-related beliefs, such as the belief that one has control over the risk of a health problem (Weinstein 1980) and the perceived severity of the issue (Weinstein 1987). This also suggests the possibility that exposure to information could influence the magnitude of optimism bias if it could adjust these beliefs.

Then a critical question for DTCA practitioners and policymakers would be what types of risk disclosure message strategies may reduce target audience’s optimism bias. Although examining the inquiry is beyond the scope of this study, the literature presents a few directions. A potentially effective method is to place an instruction in front of the health benefit claims of a DTC ad. As a form of forewarning (Apsler and Sears 1968; McCroskey 1968), the instruction could include a short message

designed to alleviate consumers' optimism bias, such as the following: "You may think that you will never experience prescription drug side effects. However, everyone's body is different, and not all drugs provide ideal benefits for everyone." Prior research suggests that a salient factor in a message draws an attentional focus (Taylor and Thompson 1982) and the maintained activation enhances processing motivation (Hallahan 2000). By reducing the extent of one's perceived control over the risk of adverse reactions, such an instruction might lower the message recipients' optimism bias. Given the findings of the current study, this may be especially effective among those with high health literacy.

Surveys show that about one-third of US adults fall under the category of low health literacy (Institute of Educational Sciences 2006; National Center for Education Statistics 2003). Research also reveals that DTCA print ads are generally "wordy and chaotic" (Krisanits 2005), and comprehending them requires a reading level beyond that of the general US population (Kaphingst and Dejong 2004). The low ability to process health information among consumers implies that lowering optimism bias, although a potentially important goal for DTCA campaigns given its role in enhancing health behavior, may not result in stronger intentions for information seeking and informed health decisions among a significant portion of US consumers. Therefore, enhancing consumer health literacy should be regarded as an important initiative from marketing as well as public health perspectives.

Aside from ways to design a single disclosure to maximize consumer processing of risk information, an alternative idea worth considering is that given substantial consumer differences, a more productive approach might be to foster an environment in which various sources of health information reinforce each other in maximizing the individual's comprehension of a drug's health risks. Especially providing complicated information in TV ads or in tiny print elsewhere may have little educational value for those with limited health literacy. In line with this idea, future research may examine how sources of risk information across various media types (i.e., television, radio, the Internet, magazines, newspapers, packages, etc.) can be integrated to form an information environment optimizing consumer understanding of the benefits and risks of prescription drug medicine. Also, new technology such as the Quick Response (QR) code could be utilized. For example, magazine readers could scan the QR code on the front page of a DTC ad in a magazine via their smart phone. Then the phone could ask if the reader is optimistically biased toward the drug's health risks and send the above-described instruction to those with a strong bias. An even more applicable idea

is that the code could allow readers to retrieve information related to the health risks of the advertised drug in consumer-friendly language, so that those with low subjective health literacy can process it. Such a method might achieve the goal of enhancing risk information processing even among consumers with low health literacy. A possible downside of the QR code approach, however, is that its benefits are limited to individuals with access to a smart phone. This limitation will be especially daunting if the population segments with low health literacy have a low rate of smart phone ownership, or if they do not have sufficient information search skills to utilize the QR code. Future researchers are encouraged to explore how effective these or similar methods are in enhancing consumer response to risk information across population segments with various levels of health literacy, information search skills, and familiarity with advances in information technology.

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