

Abstract

In the contexts of prescription drug (DTC) advertising, statistical information has been frequently used. However, little is known about how the statistical information affects consumer attitude toward the advertisement and perceived importance of an advertised illness. Based on an experiment, the present study explored the mechanism of consumers' DTC advertising information processing using structural equation modeling (SEM) approach. The findings revealed that: (a) the use of statistical information in DTC advertising positively related to perceived message effectiveness; (b) perceived message effectiveness positively related to attitude toward the advertisement and perceived importance of an advertised illness; and (c) message framing (gain versus loss) moderated the statistical information effects on consumers' perceptions. Theoretical and practical implications of DTC advertising were discussed.

**The Effects of Statistical Information in Pharmaceutical Product Advertising:
The Moderating Role of Message Framing on Attitude toward The Advertisement and
Perceived Importance of An Illness**

Under the current consumer-driven health care market, consumers may seek health information in order to make a decision. The public currently has access to health information through various media sources, such as television, print, and web sites. As an influential health information source, direct-to-consumer prescription drug advertising (DTCA), especially, has called for researchers' interests. In terms of DTCA expenditure, its spending reached \$4.3 billion in 2009 (Myers, Royne, & Deitz, 2011). Although due to the economic recession the expenditure dropped from \$4.8 billion in 2008 (Nielsen, 2009), a pharmaceutical product category is still one of the heavily advertised domains (Kaiser Family Foundation, 2010). As a result, 91% of Americans reported that they were aware of prescription drug advertising (Myers et al., 2011).

In line with this rapid growth of the DTCA market, the debate about the benefits and drawbacks of DTCA has been controversial. Proponents' assertion is that DTCA raises awareness about diseases, educates consumers, improves patient-doctor communication, and thereby empowers the public's health status. In contrast, opponents argue that DTCA tends to raise unrealistic expectations about the benefits of medication and thus increases consumer demand of medicine, thereby leading to an over-medicalized society (Myers et al., 2011; Suh et al., 2011).

Despite this severe debate, research on DTCA remains contested (Frosch et al., 2010). In marketing literature spanning several decades, more consumer-oriented DTCA research has been called for (Farris & Wilkie, 2005). Nevertheless, the effects of the practice of DTC marketing

promotion on consumer attitudes, intentions, and behaviors remain unclear (Myers et al., 2011).

Particularly, to what degree are responses to DTCA dependent on message elements and formats?

Answering such questions is important to the DTCA debate.

Current DTCA regulations require advertisers to provide trustworthy and fair balanced information of the benefits and risks of prescription drugs (Department of Health and Human Services [DHHS], 2010). In March 2010, the U.S. Food and Drug Administration (FDA) proposed amendments to DTCA guidelines to ensure that side effects and contraindications should be presented in a clear, conspicuous, and neutral manner (DHHS, 2010). Among other issues, the new guidelines include specific concerns directed toward modality, contrasts, presentation rates, and the order of information within DTCA regulations, the DTCA message structure factors. Researchers, however, agree that the current requirements are too vague (Myers et al., 2011).

In line with FDA regulations, the Pharmaceutical Research and Manufacturers Association (PhRMA) also issued voluntary guidelines, effective as of January 2006, designed to enhance the educational value of DTCA and to encourage consumers to discuss treatment options with their doctors (Atkin & Beltramini, 2007). Among the key elements of these guidelines is that “*DTC television and print advertising should be designed to achieve a balanced presentation of the benefits and risks associated with the advertised prescription medicine*” (Silver, Stevens, & Loudon, 2009). In spite of these efforts, there remains a doubt over how fair and balanced message factors can be assessed to see whether they meet the FDA regulations and self-regulation guidelines. Considering that the goal of FDA’s DTCA policy is to enhance consumer welfare and quality of life, it is important that regulatory changes should be guided by more than descriptive analyses (Davis, 2007; Myers et al., 2011).

The purpose of the current study is to better understand how statistical information affects consumers' perceived message effectiveness, attitude toward the advertisement, and perceived importance of an advertised illness in the contexts of DTCA. The current study may enable us to understand the DTCA attitude formation process more rigorously and precisely, which in turn help marketers fine-tune their sales promotion messages. Also, the study may provide insights into public policy implications based on a more consumer based findings. I begin with literature reviews relevant to each proposed construct. I then present my data and findings by a discussion of theoretical and managerial implications.

The current study aims to examine a relatively undertreated health problem domain, clinical depression among younger adults. *The American College Health Association (ACHA)* (2009) reported that about 15 percent (N = 11,777) of college students were diagnosed with clinical depression. Also, *Centers for Disease Control and Prevention (CDC)* (2010) reported that about 10 percent of Americans aged 18 to 34 currently suffer from major or minor clinical depression. Fisher and Goldney (2003) pointed out that clinical depression is more under-treated among young adults than among seniors. Further, Gonzales et al. (2010) and Kessler et al. (2003) reported that approximately half of the clinically depressed individuals received no treatment. By revealing how DTCA message strategy may influence consumers' attitude toward the advertisement and perceived importance of advertised social diseases, the current study will have implications for reducing the under-treatment of depression. As Wright et al. (2006) argued, early diagnosis and proper treatments of clinical illnesses are critical to mental health of the younger generation because a mental health issue tends to persist once it occurs. Well-informed consumers may make a better decision and therefore DTCA can be an important health information source to consumers.

Theoretical Background

The Effects of Statistical Information in DTCA

In the scientific and risk communication contexts, evidence has been divided into two broad types: “testimonial assertions” and “factual information” (Reinard, 1988). Baesler and Burgoon (1994) further divided the latter into “reports of events” and “statistics.” Statistical (interchangeably "numerical") evidence refers to “empirically quantified descriptions of events, persons, places, or other phenomena” (Baesler & Burgoon, 1994, p. 583). Analogously, Kazoleas (1993) defined "quantitative evidence" as “information about an object, person, concept or phenomena of a statistical or numerical nature” (Kazoleas, 1993, p. 40).

A large body of research demonstrated that quantitative evidence is more effective than qualifying statements. For instance, Baesler and Burgoon (1994) conducted an experiment investigating characteristics of evidence and found that statistical evidence is more persuasive than story evidence. More recently, Chang and Lee (2010) also founded that positively framed statistical information has positive impacts on consumers' message perceptions when a large number is used in the advertisement context.

What could be the mechanisms of the evidence type effects? Scholars have provided diverse potential explanations. Rosenthal (1971) provided a viable explanation. He noted that empirical statements vary widely in their specificity. Compared to ambiguous statements, the extent of credibility is augmented by the specificity of the represented reality (Rosenthal, 1971). Thus, Rosenthal (1971) pointed out that a lack of message specificity can decrease the persuasive effect. In addition, Yalch and Elmore-Yalch (1984) asserted that message quantification is expected to provide message credibility associated with numbers (Yalch & Elmore-Yalch, 1984).

Holbrook (1978) and Anderson and Jolson's (1980) studies also found the positive effects of message quantification.

There is another line of study which provides the explanations of the evidence type effects. With regard to the message scrutiny, Maheswaran and Meyers-Levy (1990) and Zhang and Buda (1999) explained that if cognitive processing is elaborated by more concrete stimuli which provide more specific information about brands or issues, the attitudinal effects will be enhanced based on cognitive psychology (Elaborated Likelihood Model: ELM, Petty & Cacioppo, 1986). Put differently, cognitive elaboration may improve message effectiveness when the evidence is perceived as trustful. According to ELM (Petty & Cacioppo, 1986), the message quality is important in the highly cognitive condition. Statistical evidence may be able to increase perceived message quality. Expanding on ELM, the current study predicts more positive persuasive effects of numerical information in the DTCA benefit appeals. When numerical information is used in DTCA benefit statements, consumer perceptions of message effectiveness will be enhanced and as a result their attitude toward ad will be enhanced (Dillard, Shen, & Vail, 2007). On the basis of the literature showing quantitative information is generally more effective than qualifying language, the following hypothesis is generated.

H1: Statistical effects will be positively associated with the evaluation of (a) perceived message effectiveness and (b) attitude toward the advertisement.

DTCA and Perceived Importance of An Social Illness

In 1991, the National Cancer Institute (NCI) and the Better Health Foundation (BHF) jointly conducted a program to increase public awareness of the importance of eating fruits and vegetables each day (Ko et al., 2010). Campbell et al. (2004) and Emmons et al. (2005) argued that health communication interventions can improve healthy behaviors when strategically

designed. Little is known, however, to understand how these health communication interventions work (Ko et al., 2010) and whether different types of message factors work differently. To advance the current state of our knowledge about pharmaceutical product advertising effects, we must identify processes which affect consumers' perceptions of pharmaceutical advertising. With regard to statistical information effects, as an outcome variable, perceived importance is addressed in the current study.

Perceived importance of an illness can be conceptualized as perception that a certain social illness is important to individuals. Consumers' perceptions of the importance of health-related issues have been reported as critical predictors of healthy behavior (e.g., An, 2008, Park & Grow, 2008; 2010). For instance, in the context of physical activity during leisure, Laffrey and Isenberg (1983) examined the role of perceived importance of physical exercise in promoting healthy behaviors. In their study, the relationship between perceived importance of physical exercise for health and the amount of physical activity during leisure was positively significant (Laffrey & Isenberg, 1983). Honjo and Siegel (2003) also examined the notion of perceived importance with regard to female adolescents' smoking behavior. In their study, they found that the perceived importance of being thin was significant of smoking behavior (Honjo & Siegel, 2003). This longitudinal study confirmed that perceived importance serves as an important health behavior determinant.

With regard to DTCA, research has shown that there is a positive relationship between DTCA exposure and consumer perception. An, Jin, and Brown (2009) conducted a study on young adults' beliefs about depression. In this study, An et al. (2009) found that high exposure to DTCA was associated with a more positive evaluation of drugs among young adults who had not

had prior personal experience with depression. Based on this finding, An et al. (2009) concluded that exposure to DTCA may increase the perceived importance of treating illnesses with drugs.

Further, Park and Grow (2010) pointed out that, once formed, risk perception is a strong antecedent of consumer involvement in healthy behaviors. Hence, as with perceived message effectiveness and attitude toward the advertisement, perceived importance of an advertised illness can be conceptualized as an important outcome of DTCA. Based on this line of reasoning, it is possible to hypothesize that statistical information will enhance perceived importance of an advertised illness and perceived message effectiveness also positively affect perceived importance. Hence, the following prediction is proposed:

H2: Statistical effects will be positively associated with the evaluation of perceived importance of depression.

Perceived Message Effectiveness on DTCA Effects

There have been substantial studies to understand the relationship between perceived and actual advertising effectiveness (Dillard, Shen, & Vail, 2007). Fishbein, Hall-Jamieson, Zimmer, von Haeften, and Nabi (2002) argued that the perceived message effectiveness may be a necessary condition for persuasive campaigns. In a similar vein, Dillard et al. (2007) asserted that manipulating perceptions of effectiveness may be a useful persuasive tool for message designers.

For this reason, advertising research has investigated how to assess perceptual advertising effectiveness and actual effects. A major body of research has demonstrated that attitude toward the advertisement (A_{ad}) is the causal determinant of attitude toward the brand (e.g., Homer & Yoon, 1992; Shimp, 1981). However, Dillard and Peck (2000, 2001) found that the same is unlikely to be true for persuasive campaigns dealing with social illnesses (Dillard et al., 2007). Rather, in the health-related contexts, effectiveness may result from the appeal demonstrating the

severity of and/or the consumer's susceptibility to health problems (Dillard et al., 2007). In this situation, statistical information may play an important role to enhance the message effectiveness. However, little has been known how statistical information influence message effectiveness to date. Further, when considering the usefulness of perceived message effectiveness as an antecedent of real advertising effectiveness, it is beneficial to investigate the relationship between perceived message effectiveness and attitude toward the advertisement and perceived importance of an advertised illness. Dillard et al. (2007) demonstrated that perceived message effectiveness is a causal predictor of attitude change (e.g., Dillard & Peck, 2000; Gunther & Storey, 2003; Hullett, 2004). Based on the previous literature, in the context of DTCA, the following hypothesis can be posited:

H3: Perceived message effectiveness is positively associated with (a) attitude toward the advertisement and (b) perceived importance of depression.

The Moderating Role of Message Framing

The purpose of the present study is to better understand the process of consumer attitude formation toward DTCA. For the purpose, this study attempts to build a model that explains the psychological mechanism of DTCA advertising message processing. Although I do not claim that my model is the only model, the model demonstrates how attitude toward the advertisement and perceived importance may be established under different conditions. Variables included in my model are perceived message effectiveness, attitude toward the advertisement, and perceived importance of an illness. Examining their structural relationships under different moderating conditions will provide pharmaceutical marketers useful information that can be used in fine-tuning their marketing communication strategies and health promotion. I compare the effects of

statistical information of DTCA across two types of message framing conditions, which have been frequently investigated message strategies (Positive versus Negative).

Research has reported that there are many confounding factors in measuring advertising effectiveness (Grewal, Gotlieb, & Marmorstein, 1994). In order to tailor DTCA more effectively, it is important to explore other factors that may influence the effectiveness of numerical information (versus qualifying language) by examining a particular message presentation format. I suggest message framing of DTCA is one such factor with potential to moderate the effects of numerical information.

Advertising messages can be framed either positively (gain) or negatively (loss). Gain framing emphasizes the advantages resulting from the purchase or use of the advertised brands, but loss framing emphasizes the potential losses if the brand is not chosen (Zhang & Buda, 1999). Chang and Lee (2010) noted that framing is one of the popular message strategies to influence consumers' perceptions, judgments, and decisions. Specifically, regarding the effects of statistical information in DTCA, Chang and Lee (2010) reported that the effects of quantitative evidence can vary depending on different message factors such as message vividness, message framing, and statistical framing. Because DTCA typically presents the health benefits of taking a prescription drugs, a critical issue in DTCA message design will be how to effectively communicate the health benefits of the drug in a way that maximizes the ad impacts on consumers' beliefs, attitudes, and intentions to treat a health condition (Kim & Park 2010).

With regard to the interaction effect between evidence type and message framing, which of two framing approaches (gain versus loss) will elaborate consumers' cognition more and thereby do not allow additional cognitive information processing? Chang and Lee (2010) suggest that consumers may become less able to manage additional statistical information when they

already elaborated their cognitive information processing by negative message framing (Chang & Lee, 2010). Thus, this will reduce the effects of statistical information (Chang & Lee, 2010). That is, when a drug's efficacy representation is already perceived as important due to negative message framing, statistical information will increase the cognitive load, limiting the effects of numerical information (Chang & Lee, 2010; Knowles & Linn, 2004).

In a similar vein, Yalch and Elmore-Yalch (1984) suggest that the excessive numeric evidence may weaken the persuasive message effects. Consumers may or may not process statistical information depending on whether they already engaged in cognitive elaboration. When consumers are already involved in cognitive information processing, an additional quantitative message would reduce their motivation to process message arguments (Yalch & Elmore-Yalch, 1984). As a result, quantitative format may get consumers become disinterested in the messages and cease paying attention to the messages (Anderson & Jolson, 1980; Holbrook, 1978). According to this view, consumers may be able to process only limited amount of information (Calder, Insko, and Yandell, 1974; Yalch and Elmore-Yalch, 1984). When the amount of information exceeds individuals' limited cognitive resource availability, the message effects may be weakened.

Psychologists call this "boomerang effects" (Chang & Lee, 2010; Knowles & Linn, 2004). In psychological reactance theory (Brehm, 1966), when consumers became alert by given stimuli (e.g., negative message framing), additional explicit persuasive attempts (e.g., statistical information) will be perceived as threats to consumers' freedom of choices (Brehm, 1966; Brehm & Brehm, 1981; Knowles & Linn, 2004). In this situation, blatant persuasive attempts can be resisted by persuasion knowledge (Friestad & Wright, 1994). This psychological resistance may negatively influence communication effects. Based on this logic, it is speculated that there

will be an interaction effect between the type of evidence (numerical information versus qualifying language) and message framing (gain versus loss). Thus, the following hypothesis can be proposed:

H4: Message framing will moderate the persuasive effects of numerical information.

That is, for a gain framed DTCA, numerical representation of a drug's health benefits will produce a more favorable evaluation of message effectiveness and more positive attitude toward the advertisement than the use of qualifying language does, whereas for a loss-framed DTCA, the effects of numerical information will be significantly reduced.

However, compared to these predicted moderating effects on attitude toward the advertisement, it is not clear how statistical information affects perceived importance. Thus, as an exploratory attempt the current study examined the interaction effects of statistical information and message framing on perceived importance of an advertised illness. Hence, the following research question can be proposed:

RQ1: What is the interaction effect pattern of message framing on the relationships between statistical information and perceived message effectiveness and perceived importance of an illness?

The Meditating Role of Perceived Message Effectiveness on DTCA Effects

Dillard, Shen, and Vail (2007) asserted that establishing the perceived message effectiveness should be viewed as a prerequisite condition for persuasive campaigns. They asserted that there are pragmatic reasons for seeking to understand the relationship between perceived message effectiveness and actual effectiveness (Dillard, Shen, & Vail, 2007). If perceived message effectiveness is a valid indicator of the actual effects of persuasive campaigns, then manipulating

perceptions of perceived effectiveness may serve as a useful technique in persuasive campaigns (Dillard, Shen, & Vail, 2007).

In the current study, perceived message effectiveness is considered as a mediator of the relationships between statistical information effects and the two dependent variables: attitude toward the advertisement and perceived importance. On the basis of the framework proposed by Dillard, Shen, and Vail (2007), perceived message effectiveness will likely be an immediate antecedent to actual attitude toward the advertisement and perceived importance, and thus should be considered as an indicator of the effectiveness of a DTCA campaign. To further explore the process in which consumers form perception of DTCA, the following hypothesis is proposed:

H5: The interactive effects of statistical information on (a) attitude toward the DTC advertisement and (b) perceived importance are mediated by perceived message effectiveness.

Proposed Model

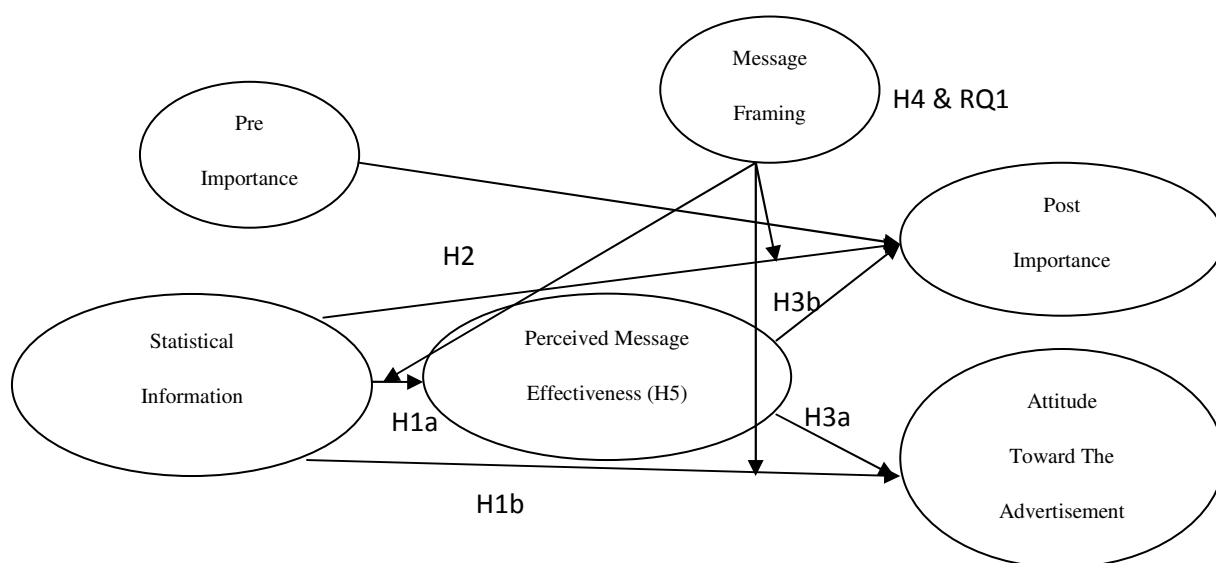
Based on the previous discussions, the five hypotheses and one research question formulated are presented in Figure 1. The model theorizes that attitude toward the advertisement and perceived importance of an illness are consequences of the statistical information effects, and that perceived message effectiveness may mediate between the statistical effects and the two dependent variables. A unique contribution of this model is that it adds to our knowledge of advertising attitude and perception by adding the interaction effects between message element (statistical information) and format (message framing) factors, which can be applied in practice.

In establishing the model, potential correlates of health product advertising effectiveness were considered. Key control variables that may affect beliefs about illnesses were also measured. They include: gender, race, current health condition, prior knowledge about illnesses,

and personal experiences with illnesses. Gender and race have been found to affect motivation and ability to acquire health information (Huh, Delorme, & Reid, 2004). In addition, the literature presents psychological factors that contribute to the perceived importance, including current health condition, previous experiences with a disease, and subjective knowledge about a disease (Block & Keller, 1995; Weinstein, 1980; Weinstein, 1987).

Figure 1

Proposed Model



An et al. (2009) pointed out that researchers need to distinguish between participants who have suffered from illnesses and those who have not. Such different bases of experience could affect perceptions of DTC ads (An et al., 2009). Except prior perceived importance of an illness, these correlates were not significantly related to dependent variables. Thus, in the model, prior importance was included to account for their external influences.

Method

Subjects and Procedure

A total of 203 undergraduate students enrolled in communication and advertising classes at a southern state university participated in return for course credit. The age ranged from 18 to 41 years and the average age was 20.33 ($SD = 2.43$). The majority (62.6%) were male and Caucasian/White (87.2%), followed by Africa/American (6.9%), Hispanics (3.4%), and Asian (1.5%). Two pretests were conducted to check the study questionnaires and experimental manipulations. Eighty-one ($N = 81$) college students participated in the pretests. Some wordings and manipulation problems were detected and then modified.

After securing the informed consent form the treatment booklets were randomized and distributed. Block and Keller (1995) pointed out that various individual differences such as prior knowledge of a disease and either through direct or vicarious experience may have impact on health-related outcomes. Thus, subjects were asked to complete the prior knowledge and experience measures (e.g., overall health status, experiences with clinical depression, and the degree of knowledge about clinical depression, etc) regarding clinical depression due to their possible influence on dependent variables. Subjects were presented with an antidepressant print advertisement. After exposure to the stimulus, subjects completed manipulation checks and dependent measures, and then provided demographic information. It took approximately 15 minutes to complete the instrument. Upon completion of the instrument, subjects were thanked.

Measurement Instruments

I measured perceived message effectiveness (Dillard, Shen, & Vail, 2007), attitude toward the advertisement (Dillard, Shen, & Vail, 2007), and perceived importance of an illness (Laffrey & Isenberg, 1983) as outcome variables. Perceived message effectiveness was measured by asking

subjects to rate on five items, including *not persuasive/persuasive*, *ineffective/effective*, *not convincing/convincing*, *not compelling/compelling*, and *forgettable/memorable* on 5-point scales from 1 = *disagree strongly* to 5 = *agree strongly*.

Attitude toward the advertisement was measured using *unfavorable/favorable*, *negative/positive*, *useless/useful* and *non-informative/informative*. Subjects rated the extent to which they agreed or disagreed with these statements using five-point scales from 1 = *disagree strongly* to 5 = *agree strongly*. These two dependent variables' Cronbach's α indices were greater than .75 (perceived message effectiveness' Cronbach's α = .84 and attitude toward the advertisement's Cronbach's α = .75), which are reliable (Grewal, Gotlieb, & Marmorstein, 1994). Responses were averaged into a single index, respectively.

Additionally, perceived importance of a certain disease concerns how much importance the respondent placed on the disease. Similar to Laffrey and Isenberg's (1983) measure, perceived importance of depression was measured using a single 5-point Likert-type scale ranging from "*not important*" (scaled 1) to "*important*" (scaled 5).

Result

Manipulation Check

To check the manipulations of evidence type (numerical information versus qualifying language) and message framing (gain versus loss), subjects were asked to answer two categorical questions. For the evidence type test, subjects were asked to choose one answer between two: "the advertisement I just saw uses qualifying language (e.g., "many" or "common") to support its arguments" or "the advertisement I just saw uses numerical information (e.g., 45%, 1 in 4) (Chang & Lee, 2010; Davis, 2007). Also, for the message framing test, subjects chose one of two: "the advertisement I just saw emphasizes benefits of taking the advertised drug" or "the

advertisement I just saw emphasizes disadvantages of not taking the advertised drug” (Block & Keller, 1995). Since these questions contained categorical choices, 2x2 chi-square tables were created. The analysis of the trends in the data confirmed that the measures are valid as the observed frequencies are clearly non-random and in the intended direction for each variable (evidence type: $\chi^2 = 141.16$, $df = 1$, $p \leq .001$.; message framing: $\chi^2 = 73.292$, $df = 1$, $p \leq .001$). The two manipulations of evidence type and message framing were successful. For the SEM model construction, the evidence type and message framing were coded as dummy variables, representing 1 = statistical evidence and 0 = qualifying language for evidence type and 1 = negative framing and 0 = positive framing for message framing. Then, the variables were included in the proposed model structure.

Model Estimation Overview

The proposed model was examined in three stages. First, the reliability and validity of the constructs were examined. Second, the overall fit of the model to the data was tested. Third, the measurement and structural parameters were examined to determine whether the data supported the proposed hypotheses. During the second and third stages, comparisons of alternative models were conducted. All data from four research cells were combined and used for the omnibus model development (Kim & Morris, 2007). Prior to the main analysis, several underlying assumptions for structural equation modeling (SEM) were checked and verified. Those SEM assumptions I checked were an adequate variable-to-sample ratio, normality, and sampling adequacy (Hair et al., 1998).

Assumption Check

Prior to the analysis, several underlying assumptions for SEM were checked. The underlying assumptions for SEM analysis are similar to those for factor analysis: There should be an

adequate variable-to-sample ratio, normality, and sampling adequacy (Hair et al., 1998). The variable-to-sample ratio was 1 to 50, which satisfies the minimum (Hair et al., 1998). Kaiser-Meyer-Olkin's measure of sampling adequacy was .85, and Bartlett's test of sphericity index also showed a significant p value at the .001 significance level, indicating substantial evidence for the planned factoring of the 11 items used in the study (Kaiser, 1974). The normality assumption was satisfied because all skewness and kurtosis values associated with each item were within the range of ± 1.96 ($-.72 < \text{all skewness values} < .25$, $-.76 < \text{all kurtosis values} < .78$).

Reliability and Validity

Reliability and validity were evaluated using the combined data from all four cells. Results show that all the scales were reliable (Cronbach's α for perceived message effectiveness = .84, attitude toward advertising = .75). Discriminant validity was evaluated using an approach suggested by Joreskog (1971). The test compared two estimated constructs by performing a χ^2 difference test on the values obtained for the constrained (correlation between the two is 1) and unconstrained models (correlation is freed to be estimated). Bagozzi and Phillips (1982) asserted that a significantly different χ^2 value between the unconstrained and constrained correlation models indicates that discriminant validity has been achieved. The significance of the χ^2 statistic was assessed by comparison with a critical χ^2 value of 3.84 ($df = 1$) (Kim & Morris, 2007). The results indicate that the pair of perceived message effectiveness and attitude toward the advertisement had significant discriminant validity (χ^2 difference = 117.124 at $df = 1$). In

addition, all factor loadings between items and their constructs were from .49 to .82 and significant, indicating convergent validity.

Confirmatory Factor Analysis (CFA)

A confirmatory factor analysis was conducted on all the items for the four constructs with all the combined data. Hu and Bentler's (1998) recommended fit indices, which are less sensitive to sample size (i.e., SRMR [standardized root mean square residual], TLI [Tucker-Lewis index], CFI [comparative fit index], IFI [incremental fit index], and RMSEA [root mean square residual]), were used as criteria for model-fit determination. All examined goodness-of-fit indices were satisfactory ($\chi^2 = 91.90$, SRMR = .04, TLI = .93; CFI = .95; IFI = .95; RMSEA = .07), demonstrating that the model was statistically plausible and stable.

Structural Equation Modeling (SEM)

SEM was performed to find overall relationships among the constructs. I tested two models. The first model excluded perceived message effectiveness and analyzed three latent variables (statistical effects, attitude toward the advertisement, and perceived importance of illnesses). In the first model, attitude toward the advertisement and perceived importance were modeled as direct consequences of statistical effects. My second model included perceived message effectiveness and tested the direct role of perceived message effectiveness in the formation of attitude toward the advertisement and perceived importance of illnesses. This two-model approach enabled me to compare the roles of perceived message effectiveness in attitude toward the advertisement and perceived importance of illnesses, respectively (Kim & Morris, 2007).

The first model with two paths (statistical effects \rightarrow post perceived importance of illnesses and attitude toward the brand; except for pre-importance) showed poor results ($\chi^2 =$

262.019, TLI = .788; CFI = .828; IFI = .833; RMSEA = .085). The path coefficient of statistical effects → post perceived importance was .159 ($p = .518$), and the path coefficient of statistical effects → attitude toward the advertisement was 1.154 ($p < .001$).

Examination of the modification index (MI) suggested that statistical effects need to be related to perceived message effectiveness as a regression path and perceived message effectiveness needs to be related to attitude toward the advertisement and perceived importance as regression paths, respectively. Also, the modification index suggested that two error variances, e_6 and e_7 , need to be related as a covariance. Accordingly, my respecified final model showed significantly increased and acceptable model fits ($\chi^2 = 138.20$, SRMR = .05, TLI = .95; CFI = .96; IFI = .96; RMSEA = .04).

The modified model indicates that perceived message effectiveness significantly influences dependent variables in the model. Almost all paths were significant at about .001 level except the paths, statistical effects → attitude toward the advertisement; .050, $p = .687$ and statistical effects → post importance; -.248, $p = .135$. However, standardized indirect effects of statistical effects on post importance and attitude toward the advertisement were significant (.27 and .41 at .01 level, respectively).

For the moderating test, message framing conditions were divided into two groups and then positive and negative framing groups were compared. When parameter constraints were added to the negative framing group, Chi-Square goodness-of-fit values were significantly changed for structural weights ($CMIN = 23.173$, $df = 11$, $p = .017$), structural covariances ($CMIN = 23.173$, $df = 12$, $p = .026$) at .05 level, and measurement residuals ($CMIN = 44.139$, $df = 25$, $p = .01$) at .01 level.

Hypothesis Testing

The current study proposed five hypotheses and one research question based on the proposed model. The results are displayed in the following diagram (See Figure 2). Because depending on different moderating conditions (e.g., positive versus negative framing) there were divergent patterns of relationships among constructs, the final model is presented without deletion of non-significant paths. However, in the omnibus model test, two paths (Statistical Information → Perceived Importance; $-.195, p = .270$ and Statistical Information → Attitude toward the advertisement; $.051, p = .680$) were not significant and therefore the two paths are represented using dash lines.

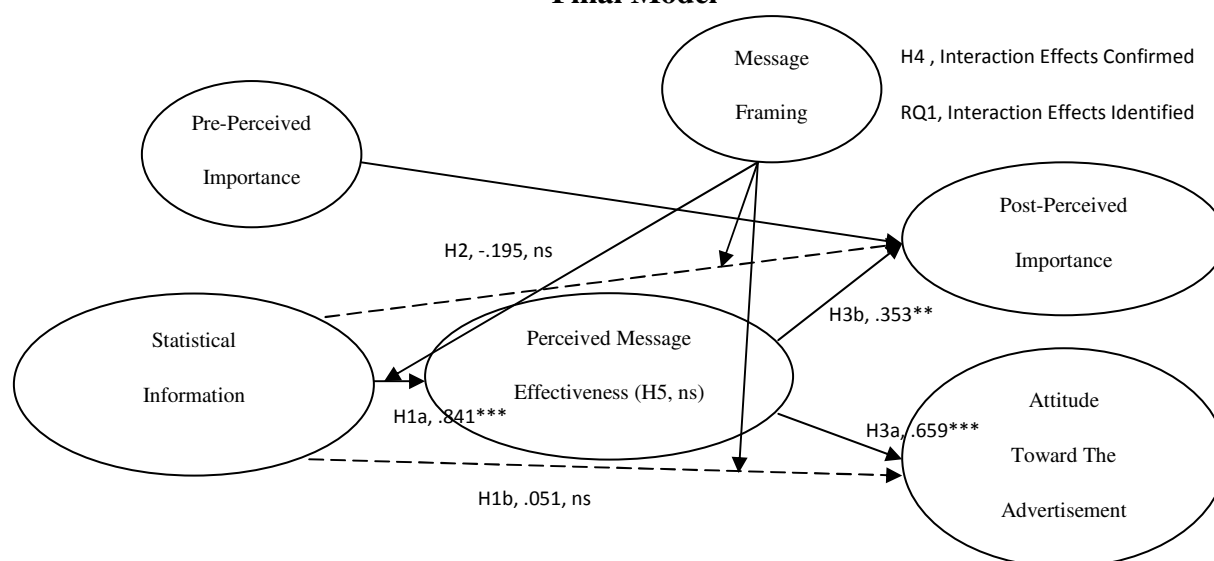
Based on the omnibus model test using combined data, the statistical information effects on perceived message effectiveness were positively significant ($.841, p < .001$), and thus H1a was supported. However, statistical effects were not significant ($.051, p < .680$) on attitude toward the advertisement and therefore H1b was not supported. Next, H2 hypothesized that statistical effects are positively significant on perceived importance of an advertised illness. However, the results were not significant ($-.195, p = .270$) and thus H2 was not supported. On the other hand, perceived message effectiveness was positively significant on both attitude toward the advertisement ($.659, p < .001$) and perceived importance of an advertised illness ($.353, p = .002$). These results supported H3a and H3b.

Further, H4 predicted the interaction effects of message framing on the relationships between statistical effects and both perceived message effectiveness and attitude toward the advertisement, respectively. Under the positive framing condition, statistical effects were significant ($.827, p < .001$) on perceived message effectiveness, but statistical effects were not significant on attitude toward the advertisement ($.050, p = .687$). However, under the negative

framing condition, the patterns were changed. Statistical effects were not significant on both perceived message effectiveness (.251, $p = .099$) and attitude toward the advertisement (-.025, $p = .785$). These results partially supported the moderating effect hypothesis on attitude toward the advertisement because the predicted moderating effect of message framing on the relationship between statistical effects and perceived message effectiveness was significant, but not between statistical effects and attitude toward advertisement.

Figure 2

Final Model



Note: ns= non-significant, ** $p < .01$, and *** $p < .001$

Regarding RQ1, intriguingly, under the negative framing condition, statistical effects were positively and significantly related to perceived importance (.280, $p = .035$), indicating statistical information has an positive impact on perceived importance of illnesses. Under the positive framing condition, statistical effects were not significant (-.248, $p = .135$) and the direction was negative. These interaction patterns with regard to perceived importance are

different from those of attitude toward the advertisement, indicating under the negative framing condition statistical information was influential to perceived importance of an illness.

Lastly, with regard to the mediating hypotheses, perceived message effectiveness did not mediate the statistical effects on the two dependent variables. Because statistical effects were not significantly related to the dependent variables, one of the four requirements of mediating tests (Baron & Kenny, 1986) was not satisfied and no other requirement tests were performed. Thus, H5 was not supported. However, in the omnibus model test, the indirect effects of statistical effects through perceived message effectiveness on both two dependent variables were significant at .05 level.

DISCUSSION

Considering tremendous dollars spent yearly by the pharmaceutical industries on DTCA, the current study's findings have important implications for DTCA message strategies. My study revealed that the effects of statistical information may be more salient in the gain framing condition than in a loss framing condition. That is, numerical information may be particularly effective at enhancing consumers' perceived message effectiveness and as a result improving consumer attitude toward DTCA, when an antidepressant DTC advertisement is positively framed. Through this mechanism, consumers may be able to consider prescription antidepressant drugs as one of the possible treatment options to properly cope with their health problems. Prescription drug ad message designers and health communication practitioners can utilize these empirical findings in tailoring their DTCA campaigns. Beyond a single-factor main effect, the current study identified under which conditions the statistical information can be more effective in terms of attitude toward the DTC advertisement. However, with regard to perceived

importance of depression, the results showed that statistical information under the negative framing was more effective. DTCA message designers need to determine a more effective message strategy depending on the campaign goals.

Theoretical Implications

The finding that the effects of statistical information versus qualifying language are dependent on message framing has theoretical implications for advertising, marketing, and health communication researchers. First, the current study's findings are consistent with the elaboration likelihood model of persuasion (ELM; Petty & Cacioppo, 1986). According to the ELM model, when individuals are motivated to engage in more elaborated information processes, persuasion effects through the central route can be enhanced. Whether a message recipient will invoke central-route or peripheral route processing may be determined by the recipients' level of available cognitive resources (Yalch & Elmore-Yalch, 1984). When the central route is invoked by a high elaboration stimulus, consumers' cognitive resources are not any more available to appraise subsequent persuasive messages. Applying to the current study, when loss framing already invoked consumers' cognitive information processing which utilizes cognitive resources, additional demanding numerical information may not be effectively processed. Therefore, statistical information could have been resisted due to information overload (Calder, Insko, & Yandell, 1974).

Further, the message framing postulate of prospect theory (Tversky & Kahneman, 1981) has explained that loss framing effect may be more salient than gain framing under risky situations. It is because of its unique message structure of loss framing compared to usual conversation situations which mostly utilize gain framing (Tversky & Kahneman, 1981; Zhang & Buda, 1999). Consumers may become more attentive to loss framing because loss framing

violates consumers' subconscious expectation for gain framing, thereby it may elaborate consumers' cognition more. Accordingly, when consumers are cognitively elaborated by loss framing, statistical information may not be effective.

This mechanism may be also explained by psychological reactance theory (Brehm 1966, 1981). According to Brehm's (1966) psychological reactance theory, resistance might have been generated when consumers perceive their freedom of choice is limited or threatened by external persuasive attempts. Once some issues were elaborated enough, additional persuasive attempts can be regarded as threats. If this is true, once consumers perceived persuasive attempts, additional strong persuasive efforts will be dismissed. This phenomenon is called "the boomerang effect" (Knowles & Linn, 2004; Zhang & Buda, 1999). In this situation, consumers will attempt to reassert their freedom by maintaining their initial opinion or by even changing their opinion as opposed to the position advocated by advertising messages.

It is important to note that, younger people may display more reactance than older people (Zhang & Buda, 1999). If main target consumers are younger adults, advertisers should consider the current study's findings more carefully. Zhang and Buda (1999) pointed out that highly cognitive individuals might be more skeptical and tend to generate more negative thoughts than less highly cognitive individuals. In addition, Yalch and Elmore-Yalch (1984) noted that college students may be more engaged in central processing. Based on these cognitive processing tendencies, college students may be more likely to generate negative thoughts and thus statistical information strategies with positive framing may be a better choice for antidepressant DTC advertisers aiming at younger adults.

In sum, understanding potential moderating variables of numerical information may help advertisers anticipate the message strategy effects on consumers' perceptions of DTCA. Message

framing is one of possible moderators of the DTCA statistical information effects. Haugtvedt, Liu, and Min (2008) emphasized that due to an arbitrary selection of moderators, inconsistencies and weak effects have been reported across social science studies. As a solution of this problem, Haugtvedt, Liu, and Min (2008) proposed that the effect of moderating variable should be investigated in many ways through a research program rather than through one individual study. For the future research, other theoretically relevant moderators can be investigated with regard to the statistical information effects, such as consumer numeracy and personal familiarity with advertised medical conditions.

Yalch and Elmore-Yalch (1984) noted that the message quantification strategy is attractive because it can be manipulated in applied settings. Further, my study revealed that the effects of statistical information can vary across different moderating conditions. As have been discussed, the effects of the statistical information were attenuated by negative framing. However, this does not downgrade the importance of loss framing. Loss framing should be regarded as an influential message framing technique to invoke consumers' cognitive attention. As introduced in the literature section, some studies found that loss framing was effective in low involvement conditions (e.g., Block & Keller, 1995; Zhang & Buda, 1999). The current study found that perceived importance was significantly positively related to statistical information effects under the negative message framing condition. This finding may imply that for the purpose of enhancing perceived importance of an illness, numerical evidence with negative framing would work more effectively. Message designers need to tailor DTCA messages according to the campaign goals.

Practical and Regulatory Implications

According to the Code of Federal Regulations (21 CFR Part 202.1), advertisements must meet certain rules in order not to be judged “misleading.” Also, Calfee (2002) pointed out that the FDA’s concept of “misleading” is parallel to the FTC’s policy of “deceptive” acts or practices. Thus, the recent DTCA public policy research suggests monitoring deceptive message strategies (e.g., Davis, 2007). Also, a body of DTCA content analysis studies (e.g., Huh & Cude, 2004) have attempted to investigate “fair balance” between benefit and risk information in the contents and formats of DTC advertisements. This line of study recommends that DTCA messages should deliver more “fair-balanced” information to consumers.

Nevertheless, DTCA regulation is elusive because regulators cannot be sure which claims will turn out to be deceptive and which will prove truthful. Regulators may want to encourage conveying more complete information to consumers. The current study’s findings may provide implications to both DTC regulators and advertisers. If statistical information is used with gain framing, it would be a better choice to alleviate the ethical dilemma because advertisers can provide more complete information to permit consumers to make a more informed decision. The use of numerical information with gain framing may be desirable in terms of the FTC’s “deceptive acts” and the FDA’s “fair balance” regulations. The use of statistical information with gain framing showed more positive perceived message effectiveness and attitude toward the advertisement. By providing statistical information with positive drug efficacy framing, DTCA campaigns can be more effective without violating regulations.

For several decades, DTCA expenditure has rapidly increased. Because of the industrial importance and its educational function of DTCA, the growth will undoubtedly continue. A better message design for DTCA may be closely related to pharmaceutical companies’ return on

investment (ROI) in many ways. DTCA message strategy research may have practical importance in that meaning as well as policy implications. As demonstrated in the current study, well-tailored message strategy will increase perceived importance of advertised illnesses. Considering the necessary condition of market expansion, establishing consumers' awareness and perceived importance of social illness is essential.

As in other studies, the current study also has limitations in affording conclusive evidence. The current study utilized an experimental approach to enhance internal validity of causal effects of statistical information and the moderating role of message framing on consumers' perceptions. Thus, the reduction of realism and other possible extraneous variables should be kept in mind when interpreting the findings. My study invites further investigation of other moderating variables as mentioned earlier, such as consumer DTCA skepticism, consumer numeracy, and personal familiarity with advertised medical conditions as potential factors. Also, with regard to outcome indices, other behavioral intention measures, such as intentions to seek health information, asking for prescriptions, and visiting physicians can be examined in addition to perceptual outcome variables used in the current study. Finally, although the current study's college student sample is appropriate for the clinical depression context and homogenous in terms of lifestyle and education levels, other diverse medical contexts and populations can provide richer insights regarding DTCA message strategies.

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