Effects of News About Genetics and Obesity on Controllability Attribution and Helping Behavior

Se-Hoon Jeong [a]

[a] Annenberg School for Communication, University of Pennsylvania,

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Se-Hoon Jeong

Annenberg School for Communication
University of Pennsylvania

This study tested the effects of news stories that offer gene-based explanations of obesity compared to behavior-based and complex (combining genetic and behavioral) explanations on Korean undergraduate students. Controllability attribution and willingness to help obese people were expected as outcomes of the 3 different news types based on attribution theory. The study results indicate significant interactions between news types and audiences' predispositions (i.e., health control beliefs) on the outcome measures. Genetic explanations of obesity, compared to behavioral explanations, tend to decrease the public's perceived controllability of obesity, yet increase their willingness to help obese people. These effects were particularly strong for people who had lower prior health control beliefs. The theoretical and practical implications of the study are further discussed.

A substantial amount of content analytic research has explored the extent to which and the ways in which the findings of genetic research are represented in health-related news in media (e.g., Lawrence, 2004; Mountcastle-Shah et al., 2003; Eyck, T. & Williment, M., 2003). On the other hand, some studies have examined the impact of genetic risk information on genetic determinism (Condit et al., 2001) and health-related perceptions and behaviors (Cappella, Lerman, Romantan, & Baruh, 2005; Condit & Parrott, 2004; Frosch, Mello, & Lerman, 2005). However, very few studies have addressed the possible consequences of news about genetics and health on the public's attitudes toward and perceptions about people with a health problem, particularly obesity. Gene-based and behavior-based explanations of a disorder may lead to differential attributions, and attribution processes predict social supportive behaviors (Weiner, 1995) that are important in dealing with health crises (see Albrecht & Adelman, 1987; Albrecht & Goldsmith, 2003). This study, therefore, tests audiences' cognitive and behavioral responses to people with obesity after reading news stories that offer different causal explanations: genetic, behavioral, and complex (i.e., a combination of genetic and behavioral).

Correspondence should be addressed to Se-Hoon Jeong, Annenberg School for Communication, University of Pennsylvania, 3620 Walnut Street, Philadelphia, PA 19104. E-mail: sjeong@asc.upenn.edu

GENETIC INFORMATION IN NEWS MEDIA

Construction of Risk

When reporting on science, including genetic research, journalists are heavily dependent on scientists and scientific research as news sources (Logan, 2001). Biomedical research on obesity (see Bell, Walley, & Froguel, 2005, for a review) suggests that various causal factors, including genes (e.g., GAD2 or SLC6A14), modern lifestyles, and social structural factors, may lead to obesity. As a consequence, biological causal claims, behavioral causal claims, and systemic causal claims (e.g., marketing junk food) are found to be the three dominant and competing frames with regard to the obesity issue in news media such as the *New York Times* from 1985 to 2003 (Lawrence, 2004). Although biomedical researchers study obesity from various perspectives, including biological and behavioral, they often focus on a single causal factor (e.g., genetic) and make causal claims based on it.

Causal claims about biological influence, such as news stories about genetic research that provide a causal link between genes and obesity, may make audiences believe that genetic influence is the primary cause of the disorder, compared to news reports that suggest obesity as a consequence of one's lifestyle and behavior. This is because news media are important sources of health information and news media coverage can influence people's health-related beliefs

and behaviors (Bernhardt & Cameron, 2003; Yanovitzky & Stryker, 2001). News stories that offer gene-based explanations of a disorder by reporting on findings from genetic research have received heavy media attention since the onset of the Human Genome Project in 1988. Based on a content analysis of various news sources, including 20 major newspapers, 3 major broadcast news networks, and the AP in the period of 1997–2003, Cappella, Humphreys, et al. (2005) found that approximately 8,000 news stories about genetics and health or behavior appeared each year. Some researchers (e.g., Mountcastle-Shah et al., 2003; Eyck & Williment, 2003) further argue that news stories often misrepresent genetics by exaggerating the findings.

Genetic news reports often make complex causal claims by suggesting the important role of lifestyle choices. Zehr (2000) has argued that news reports tend to create scientific uncertainty by providing reasons for uncertainty and controversy. In addition, genetic risk information tends to be complex and probabilistic in nature because it deals with uncertainty (Dillard, Carson, Bernard, Laxova, & Farrell, 2004; Vlek, 1987). Consistent with the notion of complexity in science and genetic risk information, content analytic research suggests that there are news reports that provide complex causal claims, in other words, combine both genetic and behavioral explanations (Cappella, Humphreys, et al., 2005). These complex news articles that suggest various interactions between genetic and behavioral causal factors thus are expected to make audiences believe that both genetic and behavioral factors contribute to obesity.[1]

Attribution Theory

Given that audiences can infer the causes of a health problem differently after being exposed to news reports that offer genetic, behavioral, or complex explanations of the health condition, attribution theory suggests some possible consequences of such reasoning. Weiner's (1995) attribution model proposes that supportive behaviors (i.e., willingness to help others) can be predicted by people's judgments of the actor's responsibility and perceptions of the actor's control over the behavior. People are more likely to help an individual with a disorder when they perceive that the actor did not have control over the outcome, thus he or she is not responsible for it. Because genetic explanations tend to be deterministic in nature or are perceived to be deterministic, they may cause individuals to view people with health disorders as having less control over the

outcome compared to lifestyle-based explanations. Attribution processes are important in public health issues because the perceived causes with regard to a disorder may affect the public's willingness to help individuals with obesity to lose weight.

Weiner's (1995) model of causal attribution includes three dimensions of cause: locus of control, controllability, and stability. With regard to social or political issues, the locus of control (i.e., internal–external) dimension of attribution has been extensively studied, and the attribution framework has been applied to news framing research to examine the effects of framing issues on audiences' judgments of responsibility (Scheufele, 2000). Iyengar (1991) suggests that although episodic framing (e.g., event- or instance-oriented reports) guides audiences to internal attribution (i.e., blaming the individual), thematic framing (e.g., reports placing an issue in general and abstract context) may lead to external attribution (i.e., blaming the society or government).

Although it is possible to frame health outcomes in terms of external responsibility (e.g., marketing fast food or community structure), the focus of this study is to compare gene-based and lifestyle-based explanations of obesity, which are both internal in nature. Thus, the controllability dimension is particularly relevant. Although behaviors are viewed as controllable causes, genes are likely to be perceived as uncontrollable causes. French, Marteau, Senior, and Weinman (2000), for example, found that people were likely to view heart disease as unpreventable when participants perceived their risk to be determined by genetics. Thus, it is expected that news reports that include causal claims about genetics and obesity, compared to those that offer behavioral explanations, will make individuals perceive the disorder as more uncontrollable. In addition, it is expected that complex news reports that suggest both genetic and behavioral explanations will make individuals perceive a moderate level of control over a disease, compared to news stories that offer genetic or behavioral explanations only.

Weiner (1995) provided some predictions regarding the consequences of causal attribution in the context of achievement and helping behaviors. Weiner's model of "attribution-responsibility-action" attempts to explain the causal process by which individuals' inference of causality leads to positive (i.e., helping) or negative (i.e., nonhelping or rejecting responses) social behaviors. Specifically, if people perceive an outcome as a result of a controllable cause, they infer the presence of responsibility by the actor. Thus, the individuals would not be willing to help (i.e., negative social behavior) the actor. On the other hand, if people perceive an outcome as a result of an uncontrollable cause, they infer that the actor is free of responsibility, thus would be willing to help (i.e., positive social behavior). There is a substantial amount of empirical evidence that supports the model (e.g.,

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[1]Condit (1999) conceptualized genetic news in terms of deterministic and probabilistic frames based on causal certainty. Although probabilistic frames and complex causal claims have much in common—that is dealing with uncertainty—this study uses the concept of complexity. This is because the purpose of this study is to test the effects of causal uncertainty with regard to a disorder as a result of the complex interactions between genetic and behavioral causal factors rather than by statistical probability.

Corrigan, Markowitz, Watson, Rowan, & Kubiak, 2003; Karasawa, 1991; Schmidt & Weiner, 1988).

Research evidence further suggests that attributions can be altered in response to the information provided. Information about an actor's control over the outcome influenced people's behavioral responses toward the actor such that onset uncontrollability elicited positive behavioral intentions (i.e., willingness to help) compared to information about onset controllability, which led to more negative behavioral intentions (Weiner, Perry, & Magnusson, 1988). For example, when given information about onset uncontrollability (e.g., AIDS caused by blood transfusion or Alzheimer's disease caused by brain dysfunction), individuals perceived that a person was less responsible compared to individuals given onset controllability information (e.g., AIDS caused by promiscuous sex life or Alzheimer's disease caused by risky sky-diving accident). However, the study did not examine the impact of complex explanations that include both controllable and uncontrollable causes of a disorder. In addition, previous research did not test the effects of genetic information, specifically in the format of news reports.

H1a: Type of news story about obesity (genetic, complex, or behavioral explanation) will influence audiences' attributions. Genetic explanations, compared to behavioral or complex explanations, will make audiences perceive that obese people have less control over and are less responsible for their weight.

H1b: Type of news story about obesity (genetic, complex, or behavioral explanation) will influence audiences' willingness to help obese individuals. Genetic explanations, compared to behavioral or complex explanations, will make audiences more willing to help obese people.

Role of Audiences' Prior Beliefs

Health-related news about genetic science may not have uniform impact on the public because there is variation in audience interpretations of genetic risk information (Condit, 1999). Because scientific research has not yet clarified the role of genes in human health, audiences have their own theories or beliefs about the causes of disorders and health issues (see Parrott et al., 2004). Markus & Zajonc (1985) have suggested an O-S-O-R model of communication effects in which the first O represents the cognitive, motivational, and structural characteristics of the audience (e.g., personality, schema, or values) that guide interpretations of the stimulus message. The second O, on the other hand, is the cognitive processing of the audience that leads to responses. With regard to genetic information, the preexisting belief structure of the audience (represented by the first O) may interact with the type of information provided in

media messages (S) that lead to helping behavior (R) mediated by attributions, including controllability and responsibility judgments (the second O).

The disconfirmation model (Edwards & Smith, 1996) may explain the interaction between belief structure of the audience and type of information. The model suggests that messages providing information counter to prior beliefs can be actively resisted, whereas those that are consonant are more easily accepted. Active, selective, and often defensive processing has been explained in terms of schema theory (see Fiske & Taylor, 1991). The cognitive concept of schema is defined as an abstract knowledge structure and serves as a preexisting theory that provides a basis for anticipating the future and interpreting new information. When receiving schema-inconsistent information, the disconfirmation model suggests that message recipients may engage in deliberative memory search to disconfirm information incompatible with their prior beliefs.

Some individuals may have a belief system that is more resistant to genetic information, including locus of control beliefs, particularly with regard to health. The construct of health locus of control (HLOC) has received attention as underlying belief orientations that guide people's perceptions of health. Rotter (1954) first introduced the locus of control concept to describe the extent to which individuals perceive their life conditions as being controllable (internal) or beyond personal control (external). Later, researchers began to develop health-specific locus of control scales. Wallston, Wallston, & DeVellis (1978) further developed a multidimensional measure of HLOC that has subscales including internal, under the control of powerful others, and a matter of chance. Frosch et al.'s (2005) study, for example, provides evidence that peoples' beliefs about health control can serve as schemas that influence the processing of genetic information. They found that individuals with high control beliefs were less likely to be influenced by genetic risk information compared to people with low control beliefs. Similarly, it is reasonable to expect that individuals with lower prior control belief will process genetic explanations of obesity less critically and thus be more influenced by the information.

H2a: Type of news story about obesity (genetic, complex, or behavioral explanation) will interact with audiences' preexisting health control beliefs on their attributions. The effects of news type will be stronger for audiences with lower control beliefs than audiences with higher control beliefs. Individuals with lower control beliefs, compared to those with higher control beliefs, will perceive that obese people have less control over and are less responsible for their weight after receiving genetic explanations.

H2b: Type of news story about obesity will interact with audiences' preexisting health control beliefs on their willingness to help obese people. The

effects of news type will be stronger for audiences with lower control beliefs than audiences with higher control beliefs. Individuals with lower control beliefs, compared to those with higher control beliefs, will be more willing to help obese people after receiving genetic explanations.

METHOD

Overview

Ninety-five undergraduate students were recruited from a psychology course at a large private university in Korea. The participants participated in the study as a course requirement. There were 36 men and 59 women in the sample and the average age was 20.3 years ($SD = 1.52$). Participants were randomly assigned to one of the three news type conditions: genetic, behavioral, or complex. The audience factor, on the other hand, was operationalized by median split (higher and lower control beliefs). There were 31 participants assigned to the genetic condition (18 with higher control beliefs and 13 with lower control beliefs), 39 to the behavioral condition (22 with higher and 17 with lower control beliefs), and 25 to the complex condition (14 with higher and 11 with lower control beliefs).

Procedure

Two tests were administered, and the participants were told that these were from two different studies. In the pretest, participants were informed that they were participating in a health perception survey and a health news evaluation study. In this phase of the study, (a) participants' beliefs about genetics and health, and beliefs about health control were obtained, and (b) the participants were asked to evaluate the newsworthiness of the stimuli articles after reading them to mask the intention of the study. In the actual test, participants were informed that they were participating in a social survey and were asked to report their perceptions regarding people with four diseases (AIDS, lung cancer, obesity, and heart disease) that occur commonly. The questionnaire measured participants' perception of people's controllability attributions with regard to the four health problems and their willingness to assist a person with the four disorders. The same items were applied to all four diseases.

Measures

Health control beliefs were measured with a modified version of Wallston et al.'s (1978) HLOC beliefs scale. Participants were asked to indicate their agreement to three items: "Each individual is in control of his/her own health outcomes," "People can stay healthy if they take the right actions," and "People can avoid illness by their healthy lifestyle" ($\alpha = .67$) on a 7-point scale ($M = 5.93$,

$SD = .88$). Then, the participants read the stimulus articles. After reading the articles, *perceived degree of determinism* suggested by the stimulus articles was measured by manipulation-check items. Participants were asked the degree to which the articles suggested obesity as "nature-based" and "immutable" ($\alpha = .71$).

Finally, participants were asked to answer questions tapping into the outcome measures. *Attributions* were measured with agreement to four items: "People who are obese are responsible for their own health"; "It's one's own fault when one becomes obese"; "People who are obese could have prevented their health condition"; and "People can avoid being obese through willful action." All four items loaded on one factor and had high interitem consistency ($\alpha = .88$). *Helping behavior* was also measured with to two items: "If you personally knew someone who is obese, would you be willing to help him/her?" and "Are you likely to help an obese person?" (*very likely* to *very unlikely*; $\alpha = .77$). Response choices for all items were on a 7-point scale.

Stimuli Construction

To increase external validity, actual news reports were selected from various news sources using KINDS (http://www.kinds.or.kr), a Korean print and broadcast news database. Four news reports were selected, two for genetic influence and two for behavioral influence conditions. The articles in the genetic explanation condition suggested the GAD2 gene or mitochondrial genes as the cause of obesity, whereas the articles in the behavioral explanation condition suggested dietary habit or physical inactivity as the primary causal factors. The articles were modified somewhat in terms of length and format to make them comparable, and the news source indicator was deleted to control for the influence of participants' prior perception of the news outlets' credibility. Then, the two articles for the complex explanation condition were constructed based on the two news articles in the genetic explanation condition. Complex explanation is conceptualized as causal uncertainty of explaining health outcomes by suggesting the possibility of both genetic and behavioral influences. Thus, the complex influence news articles were constructed by including additional information in the genetic news article such as statements that genes are not the only cause of obesity and lifestyle choices may reduce the impact of genes.

RESULTS

Manipulation Check

A manipulation check verified that the three stimulus articles differed in their explanations of obesity. Specifically, respondents perceived that the genetic news type ($M = 5.73$,

$SD = 1.03$), compared to the complex explanation news type ($M = 4.23$, $SD = 1.19$) and the behavioral explanation news type ($M = 3.77$, $SD = 1.31$), suggests obesity as more predetermined, $F(2, 92) = 6.08$, $p < .001$.

Attributions

It was predicted that audiences' attributions with regard to obesity would vary as a function of type of causal explanation provided in the news story and audiences' preexisting health control beliefs. Two-way analysis of variance revealed that the main effect of news type was not significant, $F(2, 92) = 1.45$, $p > .10$; however, the effect of audiences' prior control beliefs was significant, $F(1, 92) = 9.29$, $p < .01$. Individuals with higher prior control beliefs were more likely to make attributions that obesity is under one's control and judge that obese people are responsible for their health condition. In addition, as expected, a significant interaction between news type and health control beliefs emerged, $F(2, 92) = 6.51$, $p < .01$; see Figure 1. Participants who had higher prior health control beliefs reported higher levels of perceived control over obesity and responsibility judgments regardless of the type of news they read. On the other hand, participants who had lower prior health control beliefs had different perceptions of controllability and responsibility, according to the information they were exposed to. This type of participant perceived that obese people had less control and are less responsible for their health when they read the genetic explanations ($M = 4.15$, $SD = 1.52$) compared to the news stories that offered behavioral explanations ($M = 5.47$, $SD = 1.19$) or complex explanations ($M = 4.82$, $SD = .70$). A post hoc Tukey's honestly significant difference test suggests that this group's perceived control was significantly lower after reading news types that offer genetic explanations compared to behavioral explanations (*mean difference* $= -1.32$, $SE = .37$, $p < .01$). Perceived controllability after reading complex explanations, however, was not significantly different from that after reading genetic or behavioral explanations. In addition, when exposed to genetic type news, the attributional responses of individuals
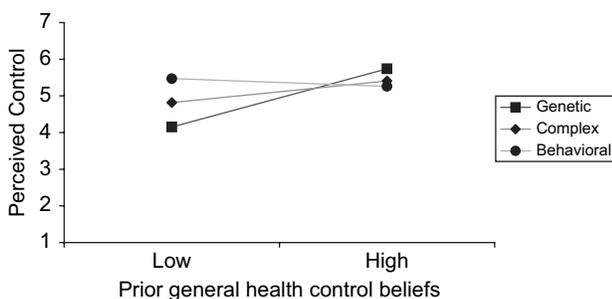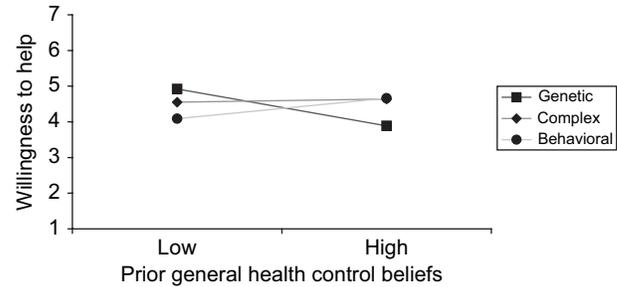
FIGURE 2 Interaction between news types and audiences' prior general health control beliefs on willingness to help obese people.

with higher and lower prior control beliefs were significantly different (*mean difference* $= 1.59$, $SE = .37$, $p < .01$). The results suggest that the lowest level of perceived control and responsibility judgment over obesity are likely to be found when genetic explanations are offered to individuals with lower prior health control beliefs (see Figure 1).

Helping Behavior

A significant interaction between news type and audience control beliefs on helping behavior also emerged, $F(2, 91) = 3.46$, $p < .05$, although there were no significant main effects of news type and audience type (see Figure 2). When reading articles that offered gene-based explanations, participants who had lower prior health control beliefs ($M = 4.92$, $SD = 1.41$) reported more willingness to help obese people compared to participants who had higher prior health control beliefs ($M = 3.89$, $SD = 1.97$). In addition, lower control belief individuals reported more willingness to help obese people after reading genetic news compared to behavioral explanations ($M = 4.09$, $SD = 1.09$) or complex explanations ($M = 4.55$, $SD = .57$). Participants who had lower prior health control beliefs displayed a lower level of controllability attributions after reading articles that offer genetic explanations. Thus, as hypothesized, this type of person is more likely to help obese people, particularly when exposed to genetic explanations, because the person would think obese people are less responsible for their health condition, whereas he or she would be less willing to help obese people when exposed to behavioral explanations.

DISCUSSION

The purpose of this study was to test the effects of news stories that offer genetic, behavioral, or complex explanations of obesity and the moderating role of preexisting general health control beliefs. As hypothesized, the data suggest significant interactions between news types and audience predispositions. People who had higher prior health control beliefs maintained high

FIGURE 1 Interaction between news types and audiences' prior general health control beliefs on controllability attributions about obesity.

perceptions of controllability and responsibility regardless of the news story they read. In contrast, controllability attribution was significantly different for people who had lower prior health control beliefs depending on the information to which they were exposed. They reported lower levels of perceived controllability and responsibility after reading news reports that suggested genetic explanations, and higher levels after reading news reports that offered behavioral or complex explanations.

The study results can be explained by the disconfirmation model (Edwards & Smith, 1996), which proposes that message recipients may attempt to disconfirm information incompatible with their prior beliefs. Based on the defensive processing mechanism of audiences when receiving schema-inconsistent information, people with higher prior control beliefs seem to process genetic information more critically. The interaction patterns suggested by this study data are somewhat comparable to Frosch et al.'s (2005) study findings. They also found that people with higher perceived control reported higher intentions to eat a healthy diet regardless of the risk information (i.e., average risk vs. increased risk) they received, whereas individuals with lower control beliefs were more influenced by the type of risk information. The studies, together, suggest that one's beliefs about control on health issues may moderate the influence of genetic information on health-related perceptions and behaviors.

The interaction effects found in this study offer support to the O-S-O-R model of communication effects (Marcus & Zajonc, 1985; McLeod, Kosicki, & McLeod, 2002). Media messages (as a stimulus) not only have direct and independent influence on audiences' responses but also interact with audience predispositions (i.e., the first O), including preexisting belief systems or personality traits such as health control beliefs. It is important to note that the construct of health control beliefs is not issue specific, and thus may serve as general health schemas. Unlike self-efficacy (Bandura, 1997), which explains and predicts performance in specific domains (e.g., diet or quitting smoking), control beliefs can be considered as a stable individual-difference variable (Haidt & Rodin, 1999). This characteristic of health control beliefs can make the construct particularly useful when predicting audiences' processing of health-related information in media. In tailoring research, studies (Holt, Clark, Kreuter, & Scharff, 2000; Williams-Piehota, Schneider, Pizarro, Mowad, & Salovey, 2004) have also found interactions between message type and prior health locus of control, thus the audience characteristic has been considered as a viable basis for tailoring health messages.

On the basis of the assumption that social support is important in dealing with health issues at the interpersonal and societal levels, this study suggests that perceptions about obese people and willingness to support them can be affected by the causal explanation provided in news stories.

The findings that genetic explanations have significantly different effects than behavioral explanations, yet complex explanations do not, particularly for individuals with lower prior control beliefs, can have important implications for the practice of journalism. Scientific findings in genetics research are inevitably subject to news coverage in media. Yet news reports that offer causal uncertainty by adding behavioral explanations in addition to the genetic science information may increase audiences' perceived control over the health problem. Lower levels of perceived control may not be problematic when considering helping behavior as an outcome because such attribution may lead to greater willingness to assist obese individuals. However, it is also possible that uncontrollability attributions lead to lower self-efficacy when people deal with their own weight problem. Thus, low perceived controllability of a health condition may not be the most desirable type of attribution. In contrast, news messages that offer complex causal claims combining genetic and behavioral explanations can make the audience perceive a moderate level of control and also make the audience willing to assist obese individuals regardless of the audience's prior beliefs. Therefore, news reports that are more balanced and complex seems to be most preferable, considering whichever outcomes (i.e., attributions or helping behavior) and audience types.

The study results also have implications for health education or health care provider–patient relationships. Attribution has been studied in health education for health professionals to understand people's attributions and develop therapeutic relationships with them so that people can make correct attributions by altering incorrect ones (Lewis & Daltory, 1990). Given that genetic science information in news messages may influence people's attributions of disorders in a negative direction, particularly people with lower control beliefs, health educators and practitioners may have to correct their attributions by interpersonal communication channels.

The study findings, finally, can have implications for health campaign or prescription drug advertising (e.g., direct-to-consumer advertising of prescription drugs) research and practice. The moderating role of health control beliefs in the effects of genetic news reports can be applied to understand the impact of persuasive health campaigns promoting healthy behaviors or drug advertisements on different segments of the population. Individuals with high and low prior control beliefs may understand and respond differently to the persuasive messages. In addition, the priming effects of news information on processing health campaign or advertising messages can also be studied. If genetic explanations of a disorder are made salient by genetic news stories, audiences may be less willing to accept persuasive messages that promote healthy lifestyles. In addition, consumers may be more willing to purchase "genetic drugs" (e.g., Vytorin; see http://www.vytorin.com) that claim to treat disorders caused by genetic or biological

causes. These effects, however, may be found only with individuals who have lower control beliefs.

This study has some limitations as well. First, the health control belief measure as an audience predisposition demonstrated relatively low interitem consistency, and this may be because items in English were translated into Korean, which has a different language structure. Second, there was small variance in the respondents' HLOC beliefs, and the majority of the participants reported relatively high control beliefs. The skewed distribution of health control beliefs may limit the generalizability of the study results.[2] The study results may be found only with a sample of college students who have relatively high control beliefs in general. Thus, future research should be conducted with more generalizable samples. Finally, because this study used actual news articles to increase ecological validity, there is a possibility of case–category confounding (Jackson, 1992, p. 31) that occurs when a small number of messages is used to represent a class of messages (e.g., genetic news).

Despite the limitations, this study offers strong support to individual differences in media influence. Based on the study results, it is likely that audiences with different levels of control beliefs process health information in media differently. For example, individuals with lower control beliefs may be more influenced by genetic explanations of health conditions, possibly due to less-critical processing of information. Thus, health educators may have to pay more attention to the ways in which this segment of the population comprehends and interprets genetic information and health communication messages in general. Future research should test the effects of genetic science information on the cognitions and behaviors related to one's own health problems (e.g., self-efficacy and intention to lose weight) and with other health issues (e.g., cancer).

ACKNOWLEDGMENTS

[2]It is important to note that participants in the lower end of internal control beliefs do not represent individuals with *low* internal control beliefs. The participants who had higher control beliefs, on the other hand, had extremely high control beliefs. The moderating role of preexisting health control beliefs found in this study is not due to qualitative differences in the beliefs but is due to relative differences.

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