EXPLORING THE EFFECTS OF MODALITY ON ATTITUDINAL AND BEHAVIORAL
RESPONSES IN THE CONTEXT OF SKIN CANCER COMMUNICATION: A MIXED
METHODS APPROACH TO THE COMMUNICATION OF SKIN CANCER

by

YIYI YANG

SHUHUA ZHOU, COMMITTEE CHAIR
ANDREW BILLINGS
KIM BISSELL
SCOTT PARROTT
JAMES LEEPER

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ABSTRACT

Visual communication has been identified as an important area both in research and in practice in health communication. In the context of skin cancer, previous work predominantly focused on the individual contribution of visuals or texts to the effects on comprehension and behavioral intentions. However, communication about skin cancer is usually multimodal – using more than one type of semiotic messages, such as picture, music and language, to convey information and meaning. Few studies have examined the relationship between different semiotic messages, such as the congruency between language and picture. In addition, little is known about the effects of multimodal portrayals on attitudes and behavioral intentions.

To address the gap in the literature, a study was created to examine the multimodal portrayal of skin cancer in women’s popular magazines and the effects of such portrayals on attitudes and behavioral intentions of indoor tanning. The study presented in the dissertation employed mixed research methods and was composed of two studies. The first drew on a lens of multimodal discourse analysis and examined how pictures and texts interactively constructed a multimodal discourse about skin cancer in women’s popular magazines. The findings suggested that pictures and texts conveyed two competing discourses about skin cancer.

Drawing on the findings of the first study, the second study was created to examine the effects of such multimodal portrayals on attitudes and behaviors. Incorporating a perspective of pictorial superiority effects, the experiment aimed to find out whether visual messages are more powerful than words in shaping people’s attitudes and behavioral intentions, especially when
words and images are incongruent in terms of message orientation. Overall, findings of the second study revealed that PSE was context-specific and was only observed when picture and text were viewed in isolation. Overall, findings from the experiment did not provide sufficient evidence to support PSE since participants across text-picture combination conditions uniformly reported high levels of intentions of tanning bed uses (6-10 times) in the next three months. Theoretical and practical implications of the two studies were discussed.
DEDICATION

This dissertation is dedicated to my family and friends. I give special thanks to my loving parents, whose encouragement and unconditional support made me feel motivated throughout the entire doctoral program. I appreciate my dissertation committee and many friends for your help in the process of writing my dissertation.
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## CONTENTS

ABSTRACT ............................................................................................................................................. ii

DEDICATION .............................................................................................................................................. iv

ACKNOWLEDGEMENTS ........................................................................................................................... v

LIST OF TABLES ....................................................................................................................................... ix

LIST OF FIGURES ..................................................................................................................................... x

CHAPTER 1 INTRODUCTION TO THE STUDY ......................................................................................... 1

CHAPTER 2 A MULTIMODAL DISCOURSE ANALYSIS OF THE PORTRAYALS OF SKIN CACANER IN WOMEN’S POPULAR MAGAZINES ................................................................................... 5

  Literature Review .................................................................................................................................. 7

    Skin cancer and prevention in the United States .................................................................................... 7

    Sociocultural discourses about tanning in the United States ............................................................... 9

    Skin Cancer in Women’s Magazines ..................................................................................................... 12

  Methods .................................................................................................................................................. 14

  Data Collection ...................................................................................................................................... 14

  Multimodal Discourse Analysis ............................................................................................................. 16

  Findings .................................................................................................................................................. 19

  Discussions ............................................................................................................................................ 34

CHAPTER 3 AN EXPERIMENT EXPLORING THE EFFECTS OF MODALITY ON ATTITUDES AND BEHAVIORAL INTENTIONS IN THE CONTEXT OF SKIN CANCER .43

  Literature Review .................................................................................................................................. 44

    Visuals in Health Communication Research ....................................................................................... 44
Theoretical Foundation: Pictorial Superiority Effect ........................................... 50

Methods .................................................................................................................. 56

Design ..................................................................................................................... 56

Participants ............................................................................................................. 61

Procedure ............................................................................................................... 61

Measures ................................................................................................................. 62

Manipulation checks .............................................................................................. 64

Discussion .............................................................................................................. 73

Revisiting the Theory Of PSE .................................................................................. 77

Limitations and Directions for Future Research .................................................... 80

CHAPTER 4 GENERAL DISCUSSION AND CONCLUSION .................................. 82

Competing Discourses Surrounding Tanning and Skin Cancer ............................. 85

Theoretical and Practical Implications .................................................................... 93

REFERENCES ....................................................................................................... 99

APPENDIX 1. TEXTUAL STIMULI ........................................................................ 114

APPENDIX 2. INSTRUMENTS USED IN STUDY 2 .............................................. 115

APPENDIX 3. IRB APPROVAL .............................................................................. 119
LIST OF TABLES

Table 1. Initial Number of Articles and Number of Articles after Screening in Each Magazine. 16

Table 2. Mean of Index Scores per Condition ................................................................. 65

Table 3. Demographic Information of Participants in Picture- and Text-only Conditions .... 67

Table 4. Demographic Information of Participants in Combination Conditions .................. 68

Table 5. Mean Scores of Dependent Variables for Picture- and Text-only Conditions ........ 70

Table 6. Mean Scores of Dependent Variables Per Combination Condition ..................... 72
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Picture 1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Picture 2</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>Picture 3</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>Picture 4</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>Picture 5</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>Picture 6</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>Picture 7</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>Picture 8</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>Picture 9</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>Picture 10</td>
<td>31</td>
</tr>
<tr>
<td>11</td>
<td>Picture 11</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>Picture 12</td>
<td>33</td>
</tr>
<tr>
<td>13</td>
<td>Picture 13</td>
<td>34</td>
</tr>
<tr>
<td>14</td>
<td>Appearance-Oriented Visual Stimulus</td>
<td>58</td>
</tr>
<tr>
<td>15</td>
<td>Health-Oriented Visual Stimulus</td>
<td>58</td>
</tr>
</tbody>
</table>
CHAPTER 1 INTRODUCTION TO THE STUDY

Skin cancer is the most common cancer in the United States (Centers for Disease Control and Prevention, 2017). Moreover, the incidences of melanoma, one of the deadliest form of skin cancer, continues to increase in the United States (CDC, 2017). However, skin cancer is also highly preventable with appropriate prevention methods for ultra-violet (UV) radiation (CDC 2017). Prolonged UV exposure, either from sunlight or artificial sources, has long been identified as a major cause for skin cancers (World Health Organization, 2015). However, despite the harmful health consequences, risky UV exposure is still prevalent, especially among young adults (Robinson, Kim, Rosenbaum, & Ortiz, 2008).

The socially constructed meaning of a tanned appearance in Western societies was found to fuel positive attitudes about tanning (Yoo & Hur, 2004). While a tanned appearance was traditionally associated with manual laborers (Martin et al., 2009), a tanned skin became a symbol of high incomes and a beauty ideal since the 1920s. The mass media played an important role in promoting pro-tan norms (e.g., Cho, Lee, & Wilson, 2010). For instance, women with a tanned appearance were usually portrayed as fit in women’s magazines by representing them engaging in outdoor activities (Cho, Lee, & Wilson, 2010).

Existing studies examining the mediated portrayals of skin cancer focused either on the texts or the images. However, co-existing semiotic messages, such as language and images, construct meaning in a collective and interactive manner (Matthiessen, 2007). Selectively examining one type of semiotic message would fail to provide a comprehensive understanding about the representations of skin cancer in the media.
To address the gap in the literature, the first study presented in the dissertation drew on a perspective of multimodal discourse analysis to explore how pictures and texts interact with each other in creating meanings about skin cancer. The first study paid special attention to women’s popular magazines, as they are an important information source about health and lifestyle for women (Kim & Ward, 2004; Thomsen, McCoy, Gustafson, & Williams, 2002). In order to include a representative sample of women’s popular magazines, a total of six highly circulated women’s popular magazines with different focuses and target audiences were included for sampling, including Vogue, Cosmopolitan, Marie Claire, Instyle, Health and Redbook (Alliance for Audited Media, 2014). The three-year-period of 2014-2016 was selected to retrieve articles focusing on skin cancer for final analysis.

Intriguing findings were identified in the first study. The primary substantive conclusion of the first study was that the texts and pictures conveyed two competing discourses about skin cancer. The textual messages primarily portrayed skin cancer from a lens of health and well-being, focusing on the negative health consequences of risky sun exposure, such as sunburn and skin cancer. In addition, the text also emphasized on preventative methods of skin cancers (e.g., applying sunscreens multiple times in sun exposure) citing researchers, doctors and other public health professionals.

Competing with the accompanying texts, the images emphasized on the cultural meaning of a tanned look, promulgating the attractiveness of a tanned skin and the recreational and social aspects of tanning. Such competing relationship in women’s magazines may reflect the existing cultural discourses about tanning and skin cancer in the United States.

As women’s magazines played an influential role in creating and shaping women’s attitudes and health behaviors (Kim & Ward, 2004; Thomsen, McCoy, Gustafson, & Williams,
2002), further investigations about the effects of such competing discourses are warranted. Consequently, drawing upon the findings of the first study, the second study used an experimental design to examine the effects of modality on attitudinal and behavioral responses in the context of skin cancer.

As the visual and textual portrayals of skin cancer were incongruent in terms of message orientation, the second study incorporated a perspective of pictorial superiority effect to see whether information presented in visuals would play a more powerful role in shaping people’s attitudes and behavioral intentions than that presented in words. Pictorial superiority effect (PSE) states that visual information is more salient in shaping perception and recall of message than verbal information (Paivio & Csapo, 1973). An experimental design was used to examine the effects of multimodal portrayals of skin cancer on attitudes and behavioral intentions of tanning.

Specifically, two sets of hypotheses were proposed to test PSE. One set of hypotheses examined PSE in the context where pictures and texts were viewed in isolation. Drawing upon the findings of the first study, the texts and pictures were either appearance-oriented or health-oriented. However, it was not clear which modality (either pictures or texts) would be more effective in generating intended messages. As such, a 2 x 2 experimental designed was created, with the first factor being modality (picture, text) and the second factor being message-orientation (appearance-oriented, health-oriented).

In addition, the findings of the first study suggested that both the pictures and texts were used to portray skin cancer in women’s magazines. However, they were incongruent in terms of message orientation. The pictures were predominantly appearance-oriented, while the accompanying texts were primarily health-oriented. As the first study was a discourse analysis, it failed to explore the effects of such incongruent messages.
Consequently, drawing upon a perspective of PSE, another set of hypotheses were proposed to find out whether pictures would have great impact than words on attitudes and behavioral intentions, when both pictures and texts were used to convey messages about skin cancer. In this case, a 2 x 2 experimental design was used, with the first factor being message orientation (appearance-oriented, health oriented) and the second factor being content congruency between pictures and texts (congruent, incongruent). As such, a total of eight experimental conditions were created to examine the effect of modality on attitudes and behavioral intentions. The experimental stimuli used in the experiments were adopted from the findings from the first study.

Overall, the research project presented in the dissertation employed mixed methods to examine the multimodal portrayal of skin cancer in women’s magazines and its effects on attitudes and behavioral intentions. The first study situated tanning and skin cancer in a larger cultural and social discourses about gender, body image, and socio-economic status. The findings of the first study informed the design of the second study. Collectively, the findings of the two studies revealed the complex cultural and health-related discourses surrounding tanning and skin cancer, which may help to create efficacious multimodal messages for skin cancer prevention and intervention programs in the future.

Study 1 and Study 2 were presented in Chapter 2 and 3 respectively. Chapter 4 were devoted to general discussions about the findings of the two studies.
CHAPTER 2 A MULTIMODAL DISCOURSE ANALYSIS OF THE PORTRAYALS OF SKIN CANCER IN WOMEN’S POPULAR MAGAZINES

One out of five people will develop skin cancer in their lifetime in the United States (Robinson, 2005). In addition to the critical personal costs caused by the disease, approximately $8 billion are dedicated to treat skin cancer annually in the United States (Guy, Machlin, Ekwueme, & Yabroff, 2015). Extended UV exposure, either from sunlight or tanning facilities, has long been identified as a major cause for non-melanoma skin cancers and malignant melanoma (World Health Organization, 2015). With increasing use of tanning beds, elevated diagnoses of melanoma among young White women have been observed in the United States (Coelho & Hearing, 2010; Hausauer et al., 2011). However, despite the chronic and acute health consequences, tanning is prevalent among younger adults, especially in young women (Robinson, Kim, Rosenbaum, & Ortiz, 2008).

Tanning was found to be fueled by the cultural meanings of a tanned appearance in Western societies (Yoo & Hur, 2004). A tanned skin is socially constructed as a symbol of high incomes, healthiness, and prestige in society (Jackson & Aiken, 2000). Women are found to be particularly vulnerable to such culture-based beliefs about a tanned appearance in the United States (Keesling & Friedman, 1987). For instance, women reported feeling more concerned and more self-relevant with skin cancer than their male counterparts, conforming to the culturally constructed expectations about women’s physical appearance and skin color (Keesling & Friedman, 1987).
The mass media not only mirror such cultural beliefs about tanning but also promulgate pro-tan attitudes (Cafri, Thompson, Jacobsen, & Hillhouse, 2009). Cafri et al. (2008) found that a predominant motive for tanning was an individual’s desire to have tanned skin like people in media (Cafri et al., 2008). As such, researchers have devoted substantial efforts to investigate the content and effects of the mediated portrayals of tanning and skin cancer, such as in the context of advertisements of tanning products and services (e.g. Freeman et al., 2006), news coverage of skin cancer (e.g. Slater, Long, Bettinghaus, & Reineke, 2008), and the portrayals of skin cancer in popular magazines (e.g. Cho et al., 2010; McWhirter & Hoffman-Goetz, 2016).

One critical limitation of the studies on the mediated portrayals of skin cancer is that the majority of the studies focuses either on the texts or the images. Such approach selectively investigates one stream of semiotic messages, ignoring the collective meaning constructed by the co-existing modalities, including pictures and texts.

To address the gap in the literature, this study conceptualizes magazine as a multimodal artifact, which is composed of multiple semiotic resources, including image, text, and other resources involving even the sense of smell. In addition, according to Nelkin’s (1995) research, magazines were found to be the most popular cancer prevention information sources. With magazines’ high quality and easily digestible content, an increase in attention and media effects were predicted because of people’s short attention spans in the current communication landscape (Newman, 2010). Popular magazines are an important source for health-related information (Len-Rios & Hinnant, 2014). For women, popular magazines were an important information source about health and lifestyle (Kim & Ward, 2004; Thomsen, McCoy, Gustafson, & Williams, 2002).
As such, drawing on a perspective of multimodal discourse analysis, this qualitative investigation analyzes the verbal and visual portrayal of skin cancer in women’s popular magazines, as well as the intersemiotic relationship between the two types of semiotic messages about skin cancer.

Theoretically, this study shed lights on the multimodal portrayals of skin cancer and the related cultural ideology perpetuated by portrayal in women’s magazines. Practically, it provides health journalists and editors baseline data which could inform future editorial practices to promote public awareness of skin cancer.

**Literature Review**

**Skin cancer and prevention in the United States**

With declining incidences of all major cancers, the epidemic of skin cancers persists in the United States (Rogers et al., 2015; Siegel, Naishadham, & Jemal, 2012). One person dies every 57 minutes from melanoma, which is one of the deadliest skin cancers (National Cancer Institute, 2011). Among all triggers of skin cancer, ultra-violet (UV) radiation accounted for 90% of all skin cancers worldwide (Armstrong & Kricker, 1993). UV radiation can be from direct sun exposure and tanning facilities (e.g., sunlamp, tanning beds, etc.).

Risky UV exposure can lead to sunburns, premature of skin, and even skin cancer. In the United States, sunburns were reported in approximately 60% of young adults on an annual basis (Saraiya, Hall, & Uhler, 2002). In addition, tanning bed uses remain prevalent among young people in the United States, which is a critical risk factor for skin cancers (Robingson, Kim, Rosenbaum, & Ortiz, 2008). In addition to skin cancer, tanning beds could lead to other severe health consequences, such as eye burns and photoaging (Greene & Brinn, 2003; Westerdahl et al., 2000). With concurrent increases of tanning bed uses (Coelho & Hearing, 2010), increasing
diagnoses of melanoma among young White women have been observed in the United States (Hausauer et al., 2011)

While skin cancer is a critical public health threat, it is also a highly preventable cancer. Sunscreen uses and sun avoidance (e.g., wearing protective clothing, staying in shade) are common sun prevention methods (Centers for Disease Control and Prevention, 2012). However, only 29-50% of people reported using sunscreen to protect themselves from UV radiation (Kasparian, Mcloone, & Meiser, 2009). In addition, sunscreen uses were also correlated with decreases of other sun-protective behaviors, such as increased time of sun exposure, which could lead to greater probability of sunburns (Vainio & Bianchini, 2001). Overall, women were found to be more likely to use sunscreen than men during sun exposure (American Academy of Dermatology, 2005).

For the deadliest form of skin cancer, early detection can help to reduce mortality rates. Skin cancer screening has been identified as an effective method to reduce melanoma mortality rates (e.g., Eisemann et al., 2014; Katalinic et al., 2012). Early detection of skin cancers could be achieved by self-examinations or skin examination by doctor (Shah et al, 2007). In addition, partner assistance contributed to the effectiveness of self-examination (Robinson, Turrisi, & Stapleton, 2007).

In addition, substantial efforts have been invested in public health campaigns and intervention programs. For instance, research conducted to date on skin cancer prevention messaging has focused on the use of gain and loss frames to reduce risky UV exposure (e.g., Gallagher & Updegraff, 2012). Systematic reviews generally reflect mixed findings regarding these two frames (e.g., Gallagher & Updegraff, 2012).
Specially, gain-framed messages focus on the benefits of sun safe behaviors, such as using sunscreens and seeking shades, while loss-frames emphasize on negative health consequences of tanning. In the existing literature, some studies supported the effectiveness of gain-framed messages, while some studies suggested that loss-framed messages were more effective in generating desirable behaviors (e.g., Thomas, Pertl, Ní Chuinneagáin, Craig, & Maher, 2011). The finding of other studies revealed no clear advantage of either frame (e.g., Van't Riet, Ruiter, Werrij, & De Vries, 2010).

One limitation of these studies lied in that they failed to associate tanning with larger socio-cultural discourses about tanning. Mixed findings of message design also urge a more innovative approach to conceptualize the public health initiative about skin cancer and prevention practices. Tanning is not just a health behavior, but also a social behavior situated in the cultural norms about gender, body image, and the symbolic meaning of socio-economic status. As such, incorporating a perspective about the sociocultural discourses surrounding tanning may serve as a more fruitful approach to generate efficacious messages for preventing risky tanning behaviors.

**Sociocultural discourses about tanning in the United States**

Tanned skin was historically associated with the manual laborers (Martin et al., 2009). People with tanned skin were traditionally perceived as having low incomes (Martin et al., 2009). However, sunny resorts and mass tourism developed rapidly after the World War II contributed to a change in the social perceptions of tanned skin in the Europe and in North America (Doré & Chignol, 2012). For instance, the change can be witnessed in the fashion industry. A tanned appearance evolved into a fashion statement in the 1920s when CoCo Chanel integrated a tanned look within her fashion design (Martin et al., 2009).
With a tanned skin becoming a symbol of high incomes and social prestige in the 1920s (Jackson & Aiken, 2000), a variety of methods of body-tanning started to emerge in the United States, such as indoor tanning beds and tanning spray (Sheehan & Lester, 2009; Martin et al., 2009).

Nowadays, tanned skin becomes a culturally constructed beauty ideal (Cafri et al., 2008). Individuals with a tanned look were found to elicit more positive impression than those without a tan (Broadstock, Borland, & Gason, 1992; Miller, Ashton, McHoskey, & Gimbel, 1990). The belief that people with a tan looked healthier and more attractive reflects the perceived pro-tan norms in the United States (Davis et al., 2002).

Age plays a role in shaping the specific perceived appearance-based benefits of tanning. Among teenagers, a tan is perceived to represent physical attractiveness, physical healthiness, as well as positive personality traits, such as risk-taking/cool personality and sociability (Calder & Aitken, 2008). For adults, appearance-based benefits of tanning included general appearance enhancement, such as physical attractiveness, and specific appearance-based improvements, such as decreasing appearance of acne and improvement of the appearance of body shape (Cafri et al., 2006). For example, with a tan, women reported experiencing higher levels of attractiveness, health, and confidence (Broadstock, et al., 1992). Overall, younger generations are more likely to embrace the appearance reasons for tanning than older adults (Carmel, Shani, & Rosenberg, 1994). One possible explanation could be that older adults tend to place less importance on physical appearance than younger people (Tiggemann, 2004).

The appearance-based benefits of tanning are the primary motivation for risky sun exposure (Geller et al., 2005; Jorgensen, Wyman, Green, & Gelb, 2000; Mahler et al., 2005) and tanning bed uses (Cokknides, Weinstock, O’Connell, & Thun, 2002). Driven by the appearance-
based motivations, women are more likely than men to engage in risky UV exposure (CDC, 2012; Guy et al., 2013). For instance, non-Hispanic White females have the highest prevalence of indoor tanning bed use among adult population with almost 30% of them tanning each year and 15% tanning at least 10 times each year (CDC, 2012; Guy et al., 2013). As such, women generally reported feeling more relevant with skin cancer than their male counterparts (Keesling & Friedman, 1987).

With the rise of mass media, the pro-tan attitudes among women are further heightened (Cafri et al., 2006). For instance, tanned women are portrayed as fit in women’s health magazines through the representations of tanned women exercising or engaging in outdoor activities (Cho, Lee, & Wilson, 2010). Reading popular women’s magazines can lead to an increase in the intention and attempts of getting a tan (Dixon et al., 2011).

Additionally, heavier female consumers of reality TV were found to have more positive attitudes towards indoor tanning and have greater intentions to engage in indoor tanning (Cho & Carcioppolo, 2011). Similarly, Fogel and Krausz (2012) found that exposure to reality TV beauty shows was positively related to risky UV exposure, including tanning lamp uses and outdoor tanning behaviors. The desire to have a tan like the favored celebrities was found to be associated with indoor tanning behaviors (Yoo & Kim, 2012).

In addition to the explicit promotion of a tanned appearance, implicit promotions can be observed in the discrepancy between the actual skin cancer incidences and the volume of news coverage about skin cancer. While skin cancer is prevalent in the U.S. population, low coverage of skin cancer has been consistently identified in the media, which may limit the public’s awareness of the increasing incidence rate of skin cancer (Stryker, Solky, & Emmons, 2005).
For instance, an examination of Associated Press’s coverage of skin cancer revealed that the coverage of the risk, prevention, and detection of skin cancer did not increase between 1986 and 2003 (Stryker, Solky, & Emmons, 2005), even though the incidences of melanoma escalated concurrently from 1973 to 2004 (Purdue, Freeman, Anderson, & Tucker, 2008). However, local newspapers provide intensive coverage of advertisements of tanning salon to its audiences. For instance, Freeman et al. (2006) found that high school newspapers contained large volume of tanning salon ads with about half of them offering unlimited tanning offers.

Moreover, sunscreen ads in women’s magazines emphasized the cosmetic purposes of the product, rather than the sun protection functions of the products (Lee et al., 2006). Moreover, none of the ads informed the audiences of proper use of sunscreen (Lee et al., 2006). Overall, the media generally failed to inform the public of relevant information about the prevalence and prevention methods about skin cancer.

**Skin Cancer in Women’s Magazines**

Popular magazines serve as an important outlet for information about beauty, health, and lifestyle for women (Andsager & Powers, 2001; Warner & Procaccino, 2004). Women’s magazines play an influential role in creating and shaping women’s beliefs about health and risk behaviors such as sexuality and body image (Kim & Ward, 2004; Thomsen, McCoy, Gustafson, & Williams, 2002). While the Internet plays an increasingly powerful role in disseminating information about health and skin cancer, magazines remain an influential media channel for skin-cancer-related beliefs (Hay et al., 2009). Information about tanning are prevalent in women’s magazines (Cho et al., 2010).

Traditional gender roles perpetuate a pervasive belief that women’s body is a commodity which is separate from the person and is subjected to observation, commentary, and evaluation
(Fredrickson & Roberts, 1997). Complying with the expectations of the traditional feminine gender roles, women’s magazines promulgate the social obsession with youthfulness (e.g. Brown & Knight, 2015) and thinness among women (e.g. Conlin & Bissell, 2014; Harper & Tiggemann, 2008). Moreover, women’s magazines usually frame health from a lens of beauty and relationships (Conlin & Bissell, 2014; Irimescu, 2015). For instance, the representations of body image are framed as appearance-oriented rather than health-related in both women’s beauty and health magazines (Conlin & Bissell, 2014).

While information about tanning is prevalent, discussions about skin cancer and skin cancer prevention were scant in women’s magazines (Basch et al., 2014). For instance, a recent research analyzed 1,986 ads and 780 articles in women’s health and fitness magazines. However, only 1% of these articles and ads covered skin and skin cancer prevention (Basch et al., 2014). Moreover, both healthy and risky behaviors are encouraged in women’s magazines (Cho et al., 2010).

In terms of research methods, existing studies about the portrayal of skin cancer in popular magazines employ a textual-oriented approach, focusing on the texts about skin cancer in a given media platform. However, a recent study by McWhirter and Hoffman-Goetz (2016) examined both the texts and images drawing upon the main constructs of Health Belief Model. However, the study merely compared the differences in the visual and verbal messages, dividing the two types of messages as two separate entities. As such, the majority of previous work on the mediated representations of tanning and skin cancer failed to examine the inter-semiotic relations between textual and visual meaning or simply regarded nonverbal representations as secondary to language (Hunt, 2015).
In health communication, examination of the visuals was identified as an important research area (Rootman & Hershfield, 1994). Existing studies on the intersection of health and visual communication mainly focused on the content of images and its effects on people’s attention, attitudes and recall of information (e.g. Andrew et al., 2014; Garcia-Retamero & Galesic, 2010; Lundell et al., 2013; Miller & Barnett, 2013; Turner et al., 2014). Drawing upon the integrative multi-semiotic model, this research investigated the emerging discourses about skin cancer in both the text and the images in women’s magazines.

Magazine was a multimodal medium, which is composed of multiple semiotic resources, such as images and text. Conceptualizing magazine as a multimodal artifact would serve as a more fruitful approach to provide a more comprehensive picture of the discourses created by both the texts and images regarding skin cancer. Moreover, to the best knowledge of the author, no research has been conducted to analyze both the images and the texts related to skin cancer in women’s magazines. Therefore, a qualitative investigation focusing on both the editorial texts and images about skin cancer in women’s magazines was warranted. As such, two research questions are proposed.

RQ1: What are the most prominent relationships between the visual and verbal elements in constructing the multimodal discourses of skin cancer in women’s popular magazines?
RQ2: What are the most prominent multimodal discourses emerged in skin-cancer-related articles in women’s popular magazines?

Methods

Data Collection

Six magazines were chosen for this research because of their large circulations (Alliance for Audited Media, 2014). Moreover, all six magazines were available in full-text online databases that include both texts and images. *Vogue, Cosmopolitan, Marie Claire, and Instyle*
were women’s fashion and lifestyle magazines with a circulation of 1,256,659 issues, 3,066,070 issues, 1,011,971 issues, and 1,756,263 issues respectively. *Health* was a women’s magazine focusing on exercise and healthy lifestyles with a circulation of 1,372,036 issues. *Redbook* targeted at more mature women with a circulation of 2,216,863 issues (Alliance for Audited Media, 2014).

In order to generate an up-to-date understanding about the discourses regarding skin cancer, this study selected a three-year-period of 2014-2016 to explore the discourses emerging from the editorial texts and images. A total of 216 issues of magazines were retrieved from the online archival databases for data collection. Six keywords were searched in the online databases, including skin cancer, melanoma, basal cell cancer, squamous cell cancer, sun protection and sun safety. These keywords were adopted from a study on news coverage about skin cancer conducted by Liu et al. (2010).

Initially, 78 articles were collected based on a search of the keywords in the 216 issues published between 2014 and 2016. However, only those articles that focused on skin cancer or discussed the issue intensively were included in the final sample for analysis. Articles that only mentioned the keywords in passing were excluded for final analysis. For instance, in an article, the author narrated that “She already knew the name of the woman. Melanie. Not so remote from the name of a fatal form of skin cancer (McEwan, 2014, p. 458).

After careful screening, a total of 29 articles were included in the final sample for analysis. Please see Table 1. for more information about the number of articles initially retrieved from each magazine and the screening results. As Table 1. confirms, the magazine that has the largest number of articles was *Cosmopolitan* ($n = 8, 27.6\%$), followed by *Marie Claire* ($n = 7,$
24.1%), *InStyle* (*n* = 5, 17.2%), *Redbook* (*n* = 5, 17.2%), *Vogue* (*n* = 3, 10.3%), and *Health* (*n* = 1, 3.4%).

Table 1. Initial Number of Articles and Number of Articles after Screening in Each Magazine

<table>
<thead>
<tr>
<th>Magazine</th>
<th>Initial Number of Article</th>
<th>After Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Vogue</em></td>
<td>6 (6.4%)</td>
<td>3 (10.3%)</td>
</tr>
<tr>
<td><em>Health</em></td>
<td>14 (14.9%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td><em>Cosmopolitan</em></td>
<td>28 (29.8%)</td>
<td>8 (27.6%)</td>
</tr>
<tr>
<td><em>Marie Claire</em></td>
<td>15 (16.0%)</td>
<td>7 (24.1%)</td>
</tr>
<tr>
<td><em>InStyle</em></td>
<td>7 (7.4%)</td>
<td>5 (17.2%)</td>
</tr>
<tr>
<td><em>Redbook</em></td>
<td>24 (25.5%)</td>
<td>5 (17.2%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>94</td>
<td>29</td>
</tr>
</tbody>
</table>

**Multimodal Discourse Analysis**

Multimodal artifacts refer to the artifacts that include different semiotic modes including language, image, music, etc. (Cameron, Deborah, & Ivan Panovic, 2014; Halliday, 1978). Multimodal discourse analysis (MDA) aims to explore the inter-semiotic relations and how different semiotic modes interact with each other in the process of meaning creation (Matthiessen, 2007). Developed based on Halliday’s (1985) social semiotic approach to language, MDA concerns with how different semiotic modes convey meaning, which ultimately construct the social reality (Halliday, 1985; Machin & Van Leeuwen, 2007).

In MDA, discourses are conceptualized as “socially constructed ways of knowing some aspects of reality which can be drawn upon when that aspect of reality has to be represented, or to put it another way, context-specific frameworks for making sense of things” (Van Leeuwen,
In other words, discourses emerge from different semiotic modes to create their intended realities by communicating their own intended messages (Van Leeuwen, 2009).

There are two major analytical approaches for MDA: the contextual approach proposed by Kress and van Leeuwen (2006) and the grammatical approach of O’Toole (2010). This study adopts the contextual approach which is significantly influenced by the framework of critical discourse analysis (Kress & Van Leeuwen, 2001). The contextual approach emphasizes the underlying ideology and the contexts of the multimodal texts (Kress & van Leeuwen, 2006). From a perceptive of the contextual approach to multimodal discourse analysis, discourse not only arises from social situations, values, and social agencies, but also leave traces in the texts (Kress & Van Leeuwen, 2006; Wodak & Meer, 2009). In other words, discourse can be both socially constitutive and socially constituted (Fairclough, 1995; Machin, 2013).

The contextual approach to MDA has been applied in various multimodal texts, such as sound and music (van Leeuwen, 1999), scientific texts (Lemke, 1998), hypermedia (Lemke, 2002), etc. Drawing upon the contextual approach, both the explicit content and the implicit connotations were attended to in this study. The ideological and cultural meaning underlined by the verbal and the visual messages about skin cancer is of particular interest to this study.

RQ1 queried about the relationship between the visual and verbal elements in the portrayals of skin cancer in women’s popular magazines. The unit of analysis was an individual article. The intersemiotic relationship was assessed by using the theorization of inter-semiosis proposed by O’Halloran (1999). Two types of relationships were conceptualized by O’Halloran (1999): co-contextualization (convergence of ideational meaning) and re-contextualization (divergence of ideational meaning). As such, the intersemiotic relationship in the skin-cancer-related articles was coded based on the dimensions of co-contextualization and re-
contextualization. The analysis of the intersemiotic relationship was accomplished by three rounds of reading. The first round of reading aimed to provide the researcher a general understanding about each article. All verbal and visual elements in the articles were carefully assessed in order to achieve a basic understanding about how each article portrayed skin cancer.

In the second round of reading, the researcher took a closer look at the major themes emerged in the texts and pictures. In addition, the major themes were classified through prioritizing, synthesizing, and abstracting (Saldaña, 2009). In the last round of reading, the researcher paid particular attention to the intersemiotic relationship revealed in each article. The intersemiotic relationship were analyzed based on the dimensions of co-contextualization (convergence of ideational meaning) and re-contextualization (divergence of ideational meaning) of the overall ideational meaning conveyed by the visual and verbal elements in each article.

RQ2 sought to find out the most prominent multimodal discourses emerged in skin-cancer-related articles in women’s popular magazines. Following the theoretical framework proposed by of Halliday (1985) and Kress and van Leeuwen (2001), multimodal discourses were viewed as sociocultural practices. For instance, the multimodal representations of an issue could instantiate the socially meaningful tensions and oppositions (Halliday, 1985; Kress and van Leeuwen, 2001). As such, RQ2 was answered based on an analysis of the underlying ideologies and social meaning of skin cancer. Specifically, following the guidance of Saldaña (2009), the researcher examined the themes that consistently and repeatedly emerged in the multimodal portrayals of skin cancer.

Overall, adopting the contextual approach to multimodal analysis (Kress & Van Leeuwen, 2006), the interactive relationships between the visual and verbal discourses were examined in detail in each article. The researcher analyzed the predominant discourses emerged
from the text and the images, including the explicit content and the implicit connotations. In the following sections, extracts from the texts and visual examples were included to provide evidences for researcher’s interpenetrations (Potter & Wetherell, 1987).

**Findings**

The analysis of articles included in the final sample ($N = 29$) revealed that the verbal and imagery discourses in the six women’s magazines conveyed two competing discourses. The texts predominantly focused on the negative health consequences of risky sun exposure, such as sunburn and skin cancer. However, the images conveyed a dominant discourse focusing on the attractiveness of a women with a tanned skin and the appearance-based benefits resulting from tanning.

In the following section, the two competing discourses were discussed in detail in each magazine. The competing relation between the verbal and the visual discourse was identified in 25 out of the 29 articles in the final sample. Fourteen out of twenty articles were cited in the following sections.

**Cosmopolitan**

A total of eight articles were retrieved from *Cosmopolitan* for final analysis. Four of these articles were cited to illustrate the dynamic between the competing discourses delivered by the images and the texts respectively.

In an article titled “*Stop sun-shaming me*”, the text heightened the importance of using sunscreen while being exposed to the sun (Ledgerwood, 2014). In addition, the text underlined the harmful effects of risky UV exposure, such as skin damage and even melanoma, the most fatal skin cancer (Ledgerwood, 2014). The following excerpt represented the predominant discourse conveyed by the text in this article:
As I suspected, most of the derms I talked to (mine included) had a clear-cut answer. “Absolutely not,” says Jennifer MacGregor, MD, clinical professor of dermatology at Columbia University. “Any change in skin color, whether it’s a tan or burn, is a sign of skin damage.” That’s because as soon as UV rays penetrate skin, pigment production goes into overdrive, acting as a protective shield…… UV radiation causes DNA mutations that can lead to all three types of skin cancer, including the most fatal and increasingly common one among 20somethings: melanoma.

The author also quoted another doctor to contend that safe sun exposure also benefited people, such as boosting their immune system, muscle strength, and bone health. Overall, the text provided a good review of both the risks and benefits of sun exposure. The important issue was that people need to monitor their sun-exposure behavior by controlling the time of sun exposure, using sun screen, conducting skin exams annually, etc. Overall, the verbal discourse underlined the importance of sun screen and the potential risks for unprotected sun exposure.

Figure 1. Picture 1.
Accompanying the text was an image of the author (see Figure 1.) sunbathing on a beach. On the left corner of this image, there was a note saying, “The writer loves the sun…but loathes the quilt”. However, the visual elements contradicted the verbal discourse presented in the note and the text. The woman depicted in the image was with a tanned look, smiling, seemed relaxing and happy. On her face, three stripes of colored zinc sunscreen were applied. However, the zinc sunscreen was used playfully and covered only a small part of her skin, contrasting the alarmism conveyed by the accompanying texts.

An article titled, “Boozing at the pool?”, focused on the association between alcohol use and the risk for melanoma. The text postulated that alcohol consumption increases skin sensitivity. Thus, consuming alcohol could increase the risks for getting sunburns and even melanoma (Negri, 2014). In addition, the text also cautioned the readers to reapply sunscreen regularly as a preventative method for sun burn and skin cancer (Negri, 2014). However, the image (see Figure 2.) incorporated in the article delivered a different discourse regarding sun exposure.

Figure 2. Picture 2.
In the image, there were a man and a woman drinking besides a pool. Both of them had tanned skin and sunbathing. Their postures were quite relaxing, raising their drinks and looking into each other’s eyes cheerfully. The picture contradicted the verbal warning of the risks of alcohol consumption while being exposed to the sun.

Similarly, in an article aimed to clarify the rumors about the harmful effects of sunscreens (Sole-Smith, 2015), the image (see Figure 3.) accompanying the text depicted a young white woman in bikini, laughing and wearing a loosely brimmed hat. The text, on the contrary, focused on the negative consequences of unprotected sun exposure. In addition, the picture was dominant visually because of its large size.

Figure 3. Picture 3.
A total of six articles were retrieved from *Vogue*. Consistent with that in *Cosmopolitan*, the overall visual and textual representations of skin cancer conflicted with one another.

In one article, skin cancer was portrayed as a critical health issue in the United States (Brown, 2014). Several preventative strategies were underlined, such as using sunscreens, wearing long-sleeve clothes, etc. (Brown, 2014).

Similarly, in another article, titled “Ban De Soleil” (ban of sun), the text represented Sarah Brown’s personal narratives about skin cancer (Walker, 2015). The Hollywood celebrity discussed her diagnosis and treatment of skin cancer. In addition, the narrative also highlighted common misconceptions of sunburn and skin cancer, citing dermatologists and epidemiological data. Overall, the text in the article emphasized the prevalence of skin cancer in the United States and cited academic sources to justify the importance of preventative methods for skin cancer.

However, the pictures accompanying the text failed to promote such health-focused content (see Figure 4. and Figure 5.). In addition, the accompanying pictures appeared to communicate contradictory messages compared to the focus of the text.

Specifically, the first picture (see Figure 4.) depicted a woman sunbathing with a hat on and wearing a swimsuit by Coco Chanel, which was indicated in the caption embedded in the picture. The woman appeared to be sunbathing besides an outdoor swimming pool. She lied relaxingly on a beach chair. A hat covered most of the woman’s face. Without a clear show of the face, the picture tended to emphasize on the overall female figure. As the readers are predominantly females, the picture can easily make the woman feel relatable.

In addition, there are an array of beach chairs lined up on the other side of the swimming pool, indicating that deliberate sun exposure is a common, normative behavior in summer. Such
visual representations reflected and endorsed the pro-tan norms in the United States. In addition, it contradicted with the claims made within the accompanying text, which focused explicitly on the prevalence of skin cancer caused by risky sun exposure behaviors.

Figure 4. Picture 4.

Another picture (see Figure 5.) portrayed a woman with tanned skin and two products that promised to give a “healthy glow”. The caption embedded in the picture appeared to be targeting at girls and women as it said, “golden girl”. The picture portrayed two tanning products emphasized on the notion of a “healthy” glow resulted from a tanned appearance. The woman depicted in the picture illustrated such appearance.
In another article collected from Vogue, the text included a health campaign promoting the awareness of melanoma and relevant preventative methods. This article provided a personal narrative about a melanoma survivor (Melanoma Research Alliance, 2014). The narrative suggested that people with darker skin tone are also susceptible to skin cancer (MRA, 2014). The text emphasized that sunscreen should be used every day to prevent the detrimental effects of unprotected sun exposure. The following excerpt demonstrates the predominant discourse deriving from the text.

Today I know that sun exposure doesn’t discriminate against skin color and can cause dryness, brown spots, wrinkles, and worst of all, melanoma—the deadliest form of skin
cancer and one of the most common cancer among women under 40……So applying sunscreen throughout the day is my daily ritual. And it should be yours, too.

Along with the text, an image of the patient was incorporated in the article. The image depicted a woman with glowing bronzed skin. The text explained that the woman’s skin had never burned because of her Latino heritage. However, the image highlighted the women’s radiant bronzed skin tone through her nudity. The picture may create an unrealistic ideal for people who struggle to manage their skin cancer complications. With no additional visual cues, the verbal portrayals of skin cancer were juxtaposed against positive visual representations of a tanned appearance.

**Health**

In an article published in *Health*, titled “*stay sun-safe from head to toe*”, the text heightened the importance of a full-coverage of sun-screen on the body, including legs, back and arms, neck and chest, lips, eyes, scalp and ears, and face (Whitmore, 2014). Moreover, the article cited doctors and public health professionals to promote the use of sunscreens as an effective prevention strategy for melanoma and other skin cancers (Whitmore, 2014). The following excerpt represents this predominant discourse emerged from the text.

Scarily, skin cancer on areas with little fat is more apt to spread because it penetrates deeper than it would on a fleshtier spot, says Dr. Zeichner. “Dip a cotton swab in SPF lotion and paint it on your part and ears,” suggests Francesca Fusco, MD, a dermatologist in New York City. Or use a sunscreen stick. A nice blowout can come in handy: One Australian study showed that hair worn down gives ears substantial coverage.

Along with the text, two images were employed in this article (see Figure 6. and Figure 7.). The text was primarily inserted in one of the images (Figure 6.), which depicted a woman sunbathing
half-naked on a beach. Overall, the image provided contradictory messages to the text which stated that backs and arms are prime spots for melanoma (Whitmore, 2014).

Figure 6. Picture 6.

Specifically, the image portrayed a woman baring arms and her back. The woman was in a bikini with a tanned skin tanning on a beach. With all her hair pulled back into a bun, she tended to get her entire body tanned as much as possible. Such visual portrayal conflicted with the text, which cited an academic source and suggested to put hair down to provide helpful coverage of ears.

Along with the image, another visually dominant image (see Figure 7.) was employed in the article.
The image (see Figure 7.) represented a woman sunbathing with her face covered by a straggling shade resulted from a straw hat. Her facial expression delivered a sense of relaxation. Similar to the first picture, this picture also represented a woman with a tanned skin. Although wearing hat may be helpful to prevent from UV radiation, the hat depicted in the picture may not be able to provide sufficient protection.

The overall visual information presented in this picture was irrelevant to the focus of the text, which explicitly cautioned the readers about the correlations between tanning and skin cancer. As such, a competing and incongruent relationship was constructed between the visual and the verbal messages.
Marie Claire

Three articles were collected from *Marie Claire* for final analysis. Two out of three articles were cited in this section.

The model-off-duty secret

The text underlined the importance and the effectiveness of sun screen for skin cancer prevention (Goldstein, 2014). The text introduced several sunscreen products through discussing several supermodel’s sunscreen choices. In addition, the text also emphasized the popularity of sunscreen in the backstage of fashion shows (Goldstein, 2014). Along with the text, images (see Figure 8.) were incorporated in the article.

Figure 8. Picture 8.
There were four images depicting four different women. The visually dominant image (large in size and in color) portrayed Miranda Kerr wearing her bikini on the beach. With a tanned skin, Miranda Kerr was smiling at the camera. The caption informed the readers that the supermodel was using a product she developed. Below the picture of Miranda Kerr, three pictures using ultraviolet photography process were provided to illustrate the effectiveness of sunscreen for preventing sun damage. Very little sun damage was detected on the face of these three women.

Figure 9. Picture 9.

In this article, a congruent relationship between the visual and verbal information was observed. However, the article also blurred the line between information and advertisement. The picture and the text congruently promoted products generated by the super model’s cosmetic company.
The other article in this magazine, on the contrary, revealed a competing relationship between the text and the image. The text stated that sunscreen and wearing hat were effective preventative strategies for skin cancer (Couche, 2014). However, the image (see Figure 9.) depicted a woman sunbathing on a beach with other people swimming and running not far away. The sunshine was strong. The ocean and other natural sceneries conveyed a connotation of recreation and healthiness.

_Instyyle_

10 ways to sunproof yourself

In this article, the text provided information regarding the danger of sun exposure and ten preventative strategies, such as using sunscreen, wearing hat, etc. (Instyle, 2014). Two images depicted two female celebrities wearing sunglasses and clothes in dark color and with tight weaves (see Figure 10. and Figure 11). Other images also illustrated different sunscreen products, apps monitoring UV index, tight-weaved top in dark color, etc. The discourses emerged from the text and the image were consistent and supplement with each other.

Figure 10. Picture 10.
A total of two articles were collected from *Redbook* for final analysis. In general, the discourses deriving from the text and the image were consistent and supplement each other.

**Can you get perfect skin in a pill?**

In this article, the text accentuated the importance of sun protection in improving one’s skin health. The text introduced a pill which could decrease UV damage and post-sun skin irritation in clinical trials (Sullivan, 2014). The image portrayed a variety of pills that made up a sun-like figure (see Figure 12.). The imagery discourse visually supplemented the textual discourse by contrasting the notion between protection (pills) and risk (sun). However, similar to the article advertising sunscreen products in *Marie Claire*, this article included advertisements when introducing factual information about skin cancer.
What dermatologists tell their friends about skin cancer?

In this article, the text underlined the importance of using sunscreens with details instructions (Mulcahy, 2014). For instance, the text discussed the different types of sunscreens and explained the meaning of SPF values. In addition, the text also mentioned the importance of using sunscreens every day, even on cloudy days and using sunscreen to protect oneself from the sunshine reflected by glass windows. Overall, the text informed that readers that tanning is a risky health behavior. Using sunscreens can be a helpful preventative method for skin cancer.

Along with the text, the article employed several images. One predominant image depicted a sand sculpture symbolizing red cross (see Figure 13.). Other images simply illustrated different sunscreen products.

The discourse emerging from the text and the images in this article revealed a consistent relationship between the inter-semiotic discourses. The text and the image were closely related with each other by emphasizing the concept of protection. Even though the image depicted sand,
Discussions

Drawing upon the contextual approach to multimodal discourse analysis, this study examined the texts and images about skin cancer in six women’s magazines. Specifically, this study investigated how words and visuals interacted with one another in constructing the realities about skin cancer. Overall, the verbal and the visual messages were incongruent in terms of message orientation. Competing relationships between the verbal and the visual discourse were identified in 25 out of the 29 articles in the final sample.

Specifically, the dominant textual discourse emphasized the harmful effects of risky sun exposure behaviors, including skin damage, sunburns, and skin cancer. In addition, the texts also promoted sun-safety strategies, such as seeking shades, wearing hats, wearing long-sleeve...
clothes, using sunscreens, etc. Many texts in the articles cited doctors and public health professionals as information source, which may enhance the credibility and believability of the textual information. However, few articles talked about the health risks related with tanning bed uses and other risky UV exposure behaviors. Overall, the textual elements coherently constructed a discourse promoting sun-safe behaviors and emphasizing the risks of unprotected sun exposure behaviors.

Competing with the verbal discourse, the images accompanying the texts constituted a visual discourse emphasizing the attractiveness of a tanned appearance. Overall, a discourse of the “attractive tanned body” was visually evoked through the representations of young, attractive models’ tanned appearance and their risky sun exposure behaviors. In most of the pictures, the models were females. Such pictorial discourse about skin cancer illustrated an idealized and narrowly defined feminine beauty in the society, which focuses on the appearance-based characteristics, such as youth, thinness (Roberts & Gettman, 2004), and a bronzed appearance (Stapleton, Turrisi, Todaro, & Robinson, 2009).

By making the observable features of female’s body particularly salient, the pictures about skin cancer and tanning heightened the role of external appearance, at least temporarily, in defining women. Such pictorial portrayals may be a reflection of the socially constructed pro-tan norms. In addition, they may reinforce the appearance-based motivations of tanning.

Appearance-based motives were found to be one of the strongest correlates of intentional UV exposure. For instance, tanning behaviors were driven by the belief that tanning can make a person look more attractive, fit, and clearer skinned (Thompson, Ata, Roehrig, & Chait, 2012). In other words, the belief suggests that a tanned skin can help an individual to look both more
attractive and healthy (Saad & Peng, 2006). As such, to look healthy may be deemed more important than being healthy in the context of tanning (Saad & Peng, 2006).

Such phenomenon is also conceptualized as internalization of cultural beauty ideals (Cash & Pruzinsky, 1990). Internationalization of beauty ideals refers to adopting the socially constructed body figure ideals as personal goals and standards (Cafri, Yamamiya, Brannick, & Thompson, 2005; Thompson & Stice, 2001; Menzel et al., 2011; Moradi & Huang, 2008). It can lead to negative concerns about one’s body-image, such as body dissatisfaction (Tylka, 2011; Murnen & Thompson, 2005).

Cultural beauty ideals may differ across genders, such that thin ideals for women and muscular ideal for men (Jones, 2004; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Wilksch, Tiggemann, & Wade, 2006). While some beauty ideals may be gender-specific, the socially constructed tanned ideal tends to be universal across genders in Western societies (Karazsia, van Dulmen, Won, & Crowther, 2013).

The internalization of a tanned ideal refers to a belief that being tanned is central to being attractive (Stapleton et al., 2017). The internalization of a tanned ideal was found to fuel appearance surveillance, which entails constant comparisons between an individual’s current appearance to the perceived tan beauty ideals (Stapleton et al., 2017). The socially constructed ideal of a tanned appearance could lead to constant monitoring of appearance and setting such social ideals as personal standards and goals (Karazsia, van Dulmen, Won, & Crowther, 2013).

For instance, frequent tanning bed uses were prevalent among adolescent girls (O’Riordan et al., 2006). High levels of tanning bed use were associated with weight concerns and harmful weight-losing behaviors, such as using laxatives or vomiting (O’Riordan et al., 2006). Moreover, frequent tanning bed uses were also associated with other risky health
behaviors, including cigarette smoking and recreational drug uses (e.g., Mosher & Danoff-Burg, 2010; O’Riordan et al., 2006).

In addition, the tanned ideal can be correlated with the thin ideal. For instance, being tanned may help an individual to look thin, but not necessarily being thin (O’Riordan et al., 2006). As such, tanning is usually adopted as a strategy to improve physical attractiveness (Hillhouse, Turrisi, & Kastner, 2000).

Women and girls were more likely to be vulnerable to socially constructed beauty ideals. From a perspective of objectification theory, girls and women typically adopt and internalize other people’s evaluations and views regarding their body (Fredrickson & Roberts, 1997). The patriarchal culture imposes a pervasive belief that women’s body is a commodity that is separate from the person and is subjected to observation, commentary, and evaluation (Fredrickson & Roberts, 1997). The objectification of women’s body may lead to the feeling of shame when girls and women fail to achieve a cultural ideal, even if it is an unrealistic one (Jones & Griffiths, 2015).

Adolescent girls could experience disgust during puberty due to the increasing visibility as sexual objects in the society (Lee, 1994). For instance, the internalization of the thin-ideal is witnessed among girls aged as early as 5-8 (Dohnt & Tiggemann, 2006). Approximately 40% of the girls reported desiring a thinner body and would use dietary restriction if they were to gain weight (Dohnt & Tiggemann, 2006). Consistent with objectification theory, women tend to believe that conforming to the body-image ideals could lead to successful life outcomes and happiness (Tolman & Debold, 1994; Evans, 2003).

The mass media were found to be a contributor to the internationalization of beauty ideals. In the context of tanning, media themes and portrayals may contribute to positive
evaluations of a tanned appearance (Cafri et al., 2006). For instance, tanned fashion models are frequently portrayed in the mass media (Cafri et al., 2006). Exposure to media portrayals of tanned models was found to increase the perceived importance of having a tanned appearance (Lee, Gray, & Mahler, 2004).

Evaluating the images in sunscreen advertisements in U.S. fashion magazines, George et al. (1996) found that the concept of a “healthy tan” was emphasized and promoted. The models in advertisements for tanning products were portrayed as darker tanned and less likely to wear hats than models in other kinds of advertisements (George et al., 1996). In addition, findings from other previous research also suggested that the emphasis on beauty benefits were found far more prominent compared to the focus of skin cancer prevention in these advertisements (Kang & Walsh-Childers, 2014). As such, the advertisements predominantly portrayed sunscreens as a beauty product and focused on their appearance-enhancement effects.

In addition, tanning was found to be a new type of substance-related disorder among frequent indoor tanners (Heckman et al., 2014; Kourosh, Harrington, & Adinoff, 2010). As such, tanning may not only be a risk factor for skin cancer, but also for mental health and substance use symptoms (Heckman et al., 2014).

Another intriguing finding of the present study was that the pictorial discourse also accentuated the recreational aspects of sun exposure behaviors. It promoted the association between hedonistic activities with deliberate sun exposure, such as partying and recreational activities on the beach. The larger socio-cultural discourse about tanning associated tanning with high incomes, such that people with high incomes would have the time and money to tan in sunny resorts.
As majority of the images depicted outdoor and natural symbols which could result in an underestimation or even neglect of the danger of unprotected sun exposure. In addition, the mere presence of visual cues of beaches and swimming pool may lead to an increase in the perceived healthiness of deliberate sun exposure. A recent study about the connotations employed in cigarette advertisements provided a valuable insight about visual connotation’s influence on people’s health beliefs. The findings revealed that the mere presence of visual cues of oceans, the sky and other natural, outdoor images also promote perceptions of healthiness, which could lead to an underestimation of the detrimental influence of smoking.

As such, the predominant imagery discourse about skin cancer could downplay the severe health outcomes of deliberate sun exposure, which could ultimately undermine the effectiveness of the accompanying texts underlining the harmful effects of risky sun exposure. In addition, the multimodal portrayal of skin cancer failed to address the prevalence and risks of tanning bed use in the United States. The overall multimodal representations of skin cancer reflected and could further reinforce pro-tan attitudes and behaviors.

While the inter-semiotic relationships were largely incongruent, such competing relationship was not identified in Redbook. The text and the pictures in Redbook congruently articulated the detrimental impact of unprotected sun exposure. One possible explanation is that Redbook is considered as a magazine for more mature women (Cho et al., 2010), who tend to place less importance on physical appearance than younger people (Tiggemann, 2004). Moreover, younger generations tend to embrace the appearance-based reasons for tanning than older age groups (Carmel, Shani, & Rosenberg, 1994). Consequently, the pictorial discourse reflected and reinforced the pro-tan norms in the United States, as it normalized risky sun
exposure behaviors by portraying the behaviors as common and being an integral part of the cultural norms.

In addition, the findings of the study revealed that the coverage of skin cancer in women’s popular magazines was not sufficient. Skin cancer is a critical health issue in the United States (Robinson, 2005). However, despite the prevalence of skin cancer in the United States, the coverage of skin-cancer-related information was relatively rare in women’s magazines. In a total of 216 issues of six different women’s magazines, only 29 articles were devoted to the discussion of skin cancer. This trend of coverage infiltrated a tendency to overlook women’s physical health and impose the pro-tan norms on women.

Finally, few articles discussed mortality rate of skin cancer. The finding is consistent with that from previous work. For instance, Jensen, Moriarty, Hurley, and Stryker (2010) reported that incidence and mortality data were rarely reported in media coverage of cancers. Health journalists and editors of women’s magazines could include more substantive information about the mortality rate of skin cancer in the future to increase public awareness of skin cancer.

The findings of this study urges study several courses of action for public health professionals and health journalists. The harmful effects of risky sun exposure and indoor tanning should be mentioned more frequently and in more details. In addition, the pictorial discourse predominantly portrayal skin cancer from a lens of appearance. Serving primarily the female clientele, women’s magazines could use such influence to empower women through combating the narrowly defined female attractiveness in the society, which merely emphasizes the socially constructed notions of physical attractiveness, such as thinness and a tanned appearance.
In addition, the promotion of physical health should be considered when editing skin cancer related media content and designing future skin cancer campaigns. Such media themes could potentially increase women’s ability to counter-argue health-compromising norms, such as tanning and drinking.

It is important to note that the study has several limitations. First, the major limitation lies in the study’s small sample size. Different genres of magazines and magazines with different target audiences should be added to generate a more diverse sample for women’s popular magazines. Continued research is needed to explore and compare the portrayal of skin cancer in different types of magazines, such as scientific magazines, news magazines, and magazines targeting at the general public.

Second, the discourse analysis conducted in this study did not include advertisements. Thus, the findings could not represent the full array of the portrayals of skin cancer in women’s magazines. Future research could examine skin cancer related advertisements and other non-editorial content.

Third, the author’s interpretations of the multimodal portrayals of skin cancer may differ from that of the readers. Future studies could establish reliable analytical framework for multimodal discourse analysis. One reason for the lack of established analytical framework may be that analytic techniques based on visual-based theories are not readily transferrable to the field of communication. For example, there is not a standard assessment tool for evaluating the images. This absence potentially hinders the testability of visual-based theories by introducing bias in image selection. Future studies aimed to create reliable analytical frameworks for visual may consider the mentioned challenges above. In addition, pictures provide greater freedom in interpretation compared with words. As such, one could argue that an image presenting a woman
sunbathing on a beach may anchor the accompanying text focusing on the risks of intentional sun exposure.

In addition, as women’s popular magazines serve as an important information source about health and lifestyles for women. Continued explorations using other methodologies, such as experimental studies, are needed to test the effects of such multimodal portrayals of skin cancer.

Overall, this study provided valuable insights to women’s magazines’ multimodal portrayal of skin cancer. This study is novel because it is among the first to conceptualize magazine as a multimodal artifact and employed an innovative analytic framework to examine health-related media content. The current communication landscape has witnessed a trend of using multiple semiotic elements to convey information. As such, a multimodal analytical perspective could be a more relevant and more fruitful approach to examine media coverage of health topics. Future research could continue to use the analytical framework proposed in the study to explore health-related topics in other multimodal artifacts, such as social media and virtual reality applications.
CHAPTER 3 AN EXPERIMENT EXPLORING THE EFFECTS OF MODALITY ON ATTITUDES AND BEHAVIORAL INTENTIONS IN THE CONTEXT OF SKIN CANCER

In health communication, the public’s ability to seek and comprehend health-related information is a critical foundation for efficacious public health initiatives. However, approximately 40% of the adult population in the United States have limited capacity to obtain and understand basic health information, which is also conceptualized as having low health literacy (U.S. Department of Health and Human Services, 2000). Low health literacy is related with poorer use of health care and disparities in health outcomes (Berkman, et al., 2011).

Presenting messages in images, pictures, videos and infographics, has been found to promote attention, comprehension, and recall of messages (Houts, Doak, Doak, & Loscalzo, 2006). Consequently, to reduce the negative outcomes of low health literacy, one feasible strategy is to present health messages in visuals.

While the significance of visual communication in health contexts has been acknowledged, research in this area remains both theoretically and practically insufficient. In terms of practical guidelines, only vague and general recommendations are provided for image selection in creating health communication materials. For instance, the National Cancer Institute offered how-to books for designing print materials for breast cancer screening with guidelines such as including a picture of women to represent the intended audience, evaluating whether the “visual concepts are clear” (p. 57), and test whether “the words, ideas, images, and layout are pleasing to the intended audience” (p. 57).
Similarly, Buki, Salazar, and Pitton (2009) created a checklist to ensure the quality of printed materials, encouraging the use of “simple, eye-catching, and culturally meaningful pictures and illustrations” (p. 566). However, there were no specific guidelines on how to select such images nor on how to create high-quality visual messages.

On the theoretical level, most existing studies on visual communication in the context of health are not guided by visual-based theories, but by core communication theories, such as framing theory, agenda setting theory, etc. (McWhirter & Hoffman-Goetz, 2014). The lack of theoretical understanding of visual communication may in return limit the use of visual messages in practices.

To address the gap in the literature, an experiment was designed to examine the interactive effects of the visual and textual portrayal of skin cancer from a perspective of pictorial superiority. Drawing on the findings of Study 1, the stimuli used in this experiment were created to examine the effect of modality on attitudes and behavioral intentions. In the presence of an increasingly multimodalled media reality, the findings of this study could have important theoretical and practical implications.

**Literature Review**

**Visuals in Health Communication Research**

Visual communication refers to any message that trigger optical stimulation (Lester, 2006). Visual communication has important theoretical and practical implications in health communication (Peregrin, 2010). For instance, visual messages could help people with low health literacy to comprehend health-related messages (Tait et al., 2010). In addition, visual images generally increase patients’ attention, recall, comprehension of health-related messages,
which ultimately affects their health behaviors and health outcomes (Houts, Doak, Doak, & Loscalzo, 2006).

Compared with texts, presenting health-related messages in visuals has advantages. First, visuals, such as photographs, illustrations, videos, are a powerful tool in delivering affective aspects of a message (Gibson & Zillmann, 2000; Messaris & Abraham, 2001; Zillmann, Gibson, & Sargent, 1999). Visuals often appear in health-related materials to convey not only ideas and information, but also meaning and emotions (King, Jensen, Davis, & Carcioppolo, 2014). Visual messages are processed more directly in the cognitive mechanism than verbal messages, suggesting that visual messages are the primary resources for meaning creation and attitudes formation (Gazzaniga, 1989; Moriarty, 1994). For instance, compared with messages presented in words, visual messages are more effective in eliciting risk perceptions, which could lead to greater behavioral intentions (Lee, Cameron, Wunsche, & Stevens, 2011; McCaul, Mullens, Romanek, Erickson, & Gatheridge, 2007).

Second, visuals are generally easier to comprehend than written messages (Tait et al., 2010). Such tendency becomes more salient when the target audience has limited levels of literacy and numeracy (Tait et al., 2010). According to U.S. Department of Health and Human Services (2000), two out of five adults have limited capacity to retrieve and comprehend information about health, which is related with poorer health outcomes. As such, visuals may have the potential to enhance the use of healthcare and improve health outcomes by increasing comprehension of health-related messages (Berkman, et al., 2011). Third, visual communication holds particular relevance to several health topics, such as skin cancer, where the signs and diagnosis are largely visual.
Existing studies paid significant attention to the individual contribution of image and text to the effects on attention, comprehension and recall of information. More recent studies also take account of the multimodal communication practices by examining messages disseminated in multiple modalities, such as language, music and pictures.

Overall, this line of research predominantly employed traditional theoretical tenets in communication, such as framing theory, to examine the visual elements in the media. Framing theory posits that frames are built on selection and salience, because framing highlights some aspect of the reality while excluding other facets (Entman, 1993). Traditionally, words are typically conceptualized as framing devices (Geise & Baden, 2015). However, frames can be constructed through any types of information, such as picture and color (de Vreese, 2005). As such, visual framing was embraced in many studies in this category. In addition, content analysis is employed as the primary research methodology.

Based on the focus of the analysis, previous work on the intersection of visual framing and content analysis can be further grouped into two major categories. One category of research examines the explicit message presented in the visuals. This category of studies focuses on the informativeness of the indexical and statistical information, such as the content of infographics and illustrations.

For instance, Welch and Young (2004) examined the visual cues in direct-to-consumer advertising of prescription drugs through a content analysis. Specifically, they measured the presence or absence of human characters and whether they were portrayed in photographs or cartoon formats. In addition, when a person’s face was visible, the demographic information was also coded. When people were not presented in the ads, the most prominent visual cues included body part, product, words, animals, and still objects.
Another category of research investigates the ideological and underlying meaning of visual presentations of health issues. Both quantitative (e.g., content analysis) and qualitative (e.g., discourse analysis) research methods were employed in this line of research.

For example, a content analysis by Heuer, McClure, and Puhl (2011) examined the images in online news stories about obesity. In the study, demographics of pictures were coded, such as news source of the image, date of publication, image credit, demographic characteristics of the person in the image, clothing style, etc. In addition, the main role and the activity performed by the person(s) portrayed in the picture were also examined, such as whether the person is eating, drinking, exercising, walking, etc. The findings of the study revealed that more than 70% of all the images portrayed the overweight person in a stigmatizing manner by focusing on the abdomen of the person, eating unhealthy food, etc. (Heuer, McClure, & Puhl, 2011).

Another example could be a study by Aubrey and Hahn (2016), which examined both the textual and visual messages about health advice in women’s health magazines. Drawing upon the coding protocol from previous work, the visual and textual messages were coded for the most prominent frames, such as appearance oriented, health frame, or body competence frame. The findings suggested that health advices were primarily framed via a lens of appearance in both the visual and the textual messages (Aubrey & Hahn, 2016).

In addition, Phillips, Della, and Sohn (2011) analyzed the articles on cancer treatment and the accompanying photographs in consumer magazines in the United States. Similar to other visual content analysis studies, the analysis of photographs in this study focused on the persons portrayed in the visuals. The demographic information of the patient or potential patient were examined, including age, gender, ethnicity. Results revealed that, while the texts concentrated on
cancer treatment, the patient or potential patient were generally depicted in a healthier way, such as engaging in yoga, bicycling, and construction work. Such contradictory messages in the visuals and texts could distort readers’ perceptions of cancer treatment realities (Phillips, Della, & Sohn, 2011).

Similarly, other topics were also examined from a lens of visual framing and content analysis. For instance, a study by Cline & Young (2004) examined visual cues in drug advertising. Another example could be a study by Parrott and Parrott (2015) that examined representations of people with mental illness in crime dramas.

In addition to examining the content of visual elements, another prominent line of research focuses on the effects of visual messages. Traditionally, this line of research focuses on the effects of visual messages on attention, recall, and responses through experimental design.

Visual messages attract and direct attention (Levie & Lentz, 1982; Rayner et al., 2001). In information processing, attention to information is the first step and may eventually impact message recall or the ability to remember information correctly (Wedel & Pieters, 2000). For instance, illustrations that complement the accompanying texts can improve people’s comprehension of the texts (e.g., Park & Lim, 2004) and message recall (e.g., Cherry et al., 2003; Kravitz et al., 1993; Liu, Kemper, & McDowd, 2009; Mayer, 2003). While conflicting findings were identified in this area of research, a comprehensive review of visual messages in health communication provided evidence that image generally increase comprehension, especially among people with lower health literacy and numeracy (Houts et al., 2006).

In addition to increasing attention and comprehension, existing studies in public health and health communication also explored the effects of visual message on attitudes and behaviors. For instance, pictorial aids were found to increase patients’ understanding of medication...
instructions (e.g., how they should take medications) (Morrow, Weiner, Young, Steinley, Deer, & Murray, 2005). In addition, messages presented in pictures also contributed to increasing behavioral adherence (Dowse & Ehlers, 2005; Mansoor & Dowse, 2003) and message recall (e.g., Bol et al., 2014; Bol et al., 2015; Nguyen et al., 2017).

Such tendency appeared to be more salient in older age groups. For instance, Bol et al. (2014) reported that cognitive and affective illustrations enhanced older adults’ recall of cancer-related information. In addition, the findings of a study by Nguyen et al., (2015) also reported that visual illustrations increased older adults’ attention to and recall of online health-related message. However, younger adults’ recall of message was not enhanced by the presence of visuals (Nguyen et al., 2015).

In addition to the use of core communication theories, other theories, such as visual perception theory, are also employed to examine the impact of visual messages. For instance, from a perspective of visual perception theory, Champlin, Lazard, Mackert, Pasch (2014) used questionnaires and eye-tracking devices to assess the impact of design quality on attention, comprehension, and perceived informativeness of the visuals in the context of health communication.

In summary, existing studies primarily employed traditional theoretical frameworks in communication to examine the effects of visual elements. Drawing upon theories in visual communication may serve as a more fruitful approach to expand the understanding of the impact of pictures on attitudes and behaviors. In addition, as skin cancer is a highly visual relevant illness, the current study espoused a theory in visual communication – pictorial superiority effects - to examine the effects of pictorial and textual representations of skin cancer on attitudes and behavioral intentions.
Theoretical Foundation: Pictorial Superiority Effect

Pictorial superiority effect (PSE) states that the recognition and recall of visual information is greater than that of verbal or textual information (Paivio & Csapo, 1973). Compared with texts, visuals have higher levels of concreteness, vividness, holism, and resemblance to sensory experience, which could trigger stronger physiological responses (Nelson, Reed, & Walling, 1976). Testing and theorizing the pictorial superiority effect initially emerged in the 1970s. For example, Paivio and Csapo’s (1973) study examined free verbal recall for items presented as pictures and as words. The study provided evidence for PSE.

Following the study, a surge of experimental studies emerged to test PSE. These experiments covered many different disciplines, such as in advertising, health communication, language learning, psychology, etc.

Multiple cognitive models were employed to explain the mechanism behind PSE. For instance, Jenkins and Harris (2010) posited that, in early stages of perception, humans tend to consciously pay more attention to concrete cues – visuals than to abstract signs – words. In other words, recipients of messages actively select visual cues to assess in early stages of perception (Jenkins & Harris, 2001). Accompanying such selective visual attention, active mental and emotional processing is observed (Goldstein & Fink, 1981). As such, visual messages are granted more salience than textual messages in perception and memory (Kress & van Leeuwen, 2010).

In addition, dual-code theory has also been widely used to explain PSE. Dual-code theory posits that the visual messages are encoded and stored in memory in a qualitatively different way than verbal messages (Paivio, 1986). Visuals can be encoded into both visual and verbal codes, while texts can only be encoded into verbal codes (Paivio, 1971).
As visual and textual messages are qualitatively differentiated in human minds, the encoding of visual and verbal cues is achieved via two different cognitive subsystems (Kolers & Brison, 1984; Paivio, 1971). While the two subsystems are independent, they are reciprocally connected (Paivio, 1971). Information retrieved from the visual and verbal cues can be transferred between the subsystems (Paivio, 1986). As such, images provide additional learning cues at the time of comprehending verbal messages and generate additional cognitive sources at the retrieval of textual information from memory (Burgoon, 1985; Folger & Woodall, 1982; Gunter, 1987; Stone, 1987). The interaction effect of the two subsystems is also called cue summation, which helps to explain PSE in message recall (Paivio, 1969; Severin, 1967).

In the context of health communication, PSE has also been supported in different communicative contexts. For instance, a study by Gibson and Zillmann (2000) investigated the effects of images on message recall in the context of fictitious Lyme-like disease carried by deer. The participants were exposed to an article either with or without images of the fictitious mutant of the deer tick. The findings revealed that the experimental material with deer tick images prompted better message recall. While the finding pointed towards PSE, the study was not guided by PSE or any other visual-based theories.

In the existing literature in health communication, the utilization of PSE is both theoretically and practically insufficient. Several factors may contribute to the omission of PSE. First, it could be an oversight by communication researchers. Or, it may reflect disciplinary solitudes that the field of visual communication is separate from the field of health communication. For example, visual communication texts do not usually give attention to health communication as a field (Schiavo, 2007; Smith et al., 2005). In addition, visual-based theories
do not include communication concepts, such as audiences’ attitudinal responses to a visual stimulus, etc.

Second, conflicting findings may have discouraged communication scholars to use visual-based theories. While PSE has been supported in various communicative circumstances, mixed findings were also identified. For example, a study by Stephenson and Witte (1998) found the persuasiveness of textual messages about skin cancer was not increased by intense images. However, others found that adding visuals can enhance comprehension of health-related information in patients, such as messages about treatment and clinical explanations (Kim et al., 2013).

In addition, existing studies found an interaction between participants’ interests and the specific content in an image. For instance, Arpan et al. (2006) conducted a study on news coverage of social protests, using images representing different levels of conflict. The results suggested that images showing higher levels of conflict led to more negative evaluations of the protest and protesters. However, such tendency was only observed when the participants felt interested in the social issue.

Similarly, Domke, Perlmutter, and Spratt (2002) argued that the incorporation of images influences the audiences’ attention and perceptions. However, participant’s predispositions, values and existing knowledge regarding the issue interact with the content of an image, which further influences people’s information processing (Domke, Perlmutter, & Spratt, 2002).

One possible explanation for such phenomenon is that visualization of information does not depend on a fixed meaning translation between the signifier and signified (Rose, 2012). While relevant socio-cultural contexts could reduce the ambiguity of visual information, visuals may still deliver implicit and abstract meaning that exists beyond the concrete representations.
(Geise & Baden, 2015; Schuermann, 2011; Mitchell, 1986). Mixed findings aside, PSE was supported in various communicative contexts, although most of these existing studies are not based on the theoretical foundation of PSE. Taken together, these findings reveal the complex effects of multimodal information and do not suffice to falsify PSE.

As visual communication has been identified as an important area of research, especially in the context of skin cancer, it is important to explore how visual and text may impact people’s attitudinal and behavioral responses. Drawing upon PSE, the first two hypotheses were proposed to find out whether images would have greater impact than texts on attitudes and behavioral intentions when images and texts are viewed in isolation in the context of skin cancer.

H1a: When viewed in isolation, pictures will have stronger impacts on recipients’ attitudinal responses than the texts in the context of skin cancer.

H1b: When viewed in isolation, pictures will have stronger impacts on recipients’ behavioral intentions than the texts in the context of skin cancer.

As stated previously, when pictures and texts are viewed in isolation, cue summation can help to explain PSE. When both visual and textual cues are present to convey information, cue summation was also witnessed (Paivio, 1986). Moreover, presenting information in both visual and verbal cues not only lead to better comprehension, but also create meanings that transcend the information provided through each individual modality (Paivio, 1986). For instance, findings from existing studies revealed that the attention-capturing function of pictures was not limited to the images themselves, but also triggers an interest in the image-related texts (Gibson, 1991).

Wolf and Grotta’s (1985) study was among the first to explore the role of images in news reading. They manipulated the front page of a newspaper which featured a news story of a dancer who won a prestigious ballet scholarship. Accompanying the text, three equally sized
photographs were present illustrating either a portrait of the dancer, the dancer performing a grand jeté leap, or an art display unrelated to the story. Respondents were instructed to read the paper and were asked later to recall how much of the news article they had read and details regarding the story.

Results showed that the portrait of the dancer was the most effective in promoting reading of the story and recall of messages, with about 80% of students exposed to the condition reporting thorough attention. The picture showing an unrelated art display fostered the least reading and message recall (48% of the participants in this group reported thorough attention), while the photograph featuring the grand jeté prompted intermediate reading and recall (percentage not reported). While some information regarding the results were missing and the investigators failed to include a no-image control condition, Wolf and Grotta’s (1985) study provided the first insights regarding the effects of visuals in promoting attention and recall in the context of news reading.

A study by Zillmann, Knobloch, and Yu (2001) investigated the effects of visuals on selective reading of news articles. Employing the standard format of news magazines, such as *Time* and *Newsweek*, the researchers generated news articles with manipulated images or no images, while holding the accompanying text constant. Participants were asked to choose freely from different versions of articles, which allowed the researchers to examine the effects of visuals on selective news reading. The participants’ eye movement were recorded.

The findings revealed that, when the images were present, participants invariably first browsed the photographs, then the headlines. The participants usually scanned several different headlines before they started to read the text of articles. In addition, compared with the no-image control condition, the presence of images increased reading time by at least 16.5%.
Messages represented in multiple modalities were also found to improve comprehension. For instance, Graber (1990) used TV news to examine the effects of the incorporation of congruent visuals in relevant audio messages. In this study, the addition of congruent visuals increased message recall and issue understanding. Similarly, Reese (1984) used similar TV news stimuli and found similar results through experiments.

One possible explanation for such interaction effect is that visual messages give higher levels of openness in the interpretation of meaning than textual messages (Geise & Baden, 2015). As the meaning is represented in a more holistic manner in pictures than in texts, the selection of pictorial elements is subject to higher degrees of freedom compared with textual messages (Bundesen & Habekost, 2008). For instance, an individual’s existing knowledge, beliefs, and communication purpose would guide the recipient’s search for expected visual cues (Yarbus, 1967) and specific contextual information (Bundesen & Habekost, 2008).

In addition, Pfau et al. (2006) found that the text accompanying the image also played a role. In their experimental study focusing on the Iraq war, participants were exposed to one of the following conditions: images of the war with a short caption, images with full text of a news article, and a text with no images. The results showed that images with a brief caption was the most effective in decreasing support for the United States’ presence in Iraq.

In summary, findings from previous research supported PSE when messages were presented in both pictures and texts. In addition, the congruency between the visual and textual messages heightened PSE. As such, drawing upon the findings of the first study, the following hypotheses were proposed to examine PSE in the context where both pictorial and textual messages were presented. Specifically, congruency of messages orientations in pictures and texts were included as a major independent variable.
H2a: When the picture and the text are incongruent in terms of content, messages presented in the pictures will have more influence on recipients’ attitudinal responses than that presented in texts.

H2b: When the picture and the text are incongruent in terms of content, messages presented in the pictures will have more influence on recipients’ behavioral intentions than that presented in texts.

H3a: When the picture and the text are congruent in terms of content, they will have larger impact on recipients’ attitudinal responses than those who are incongruent in terms of content.

H3b: When the picture and the text are congruent in terms of content, they will have larger impact on recipients’ behavioral intentions than those who are incongruent in terms of content.

Methods

Design

An online survey-embedded experiment was created to test the hypotheses. Drawing on the findings of the first study, H1a and H1b focused on the impact of message orientation and modality on attitudes and behavioral intentions. One major finding of the first study was that the pictures and texts in women’s popular magazines delivered two competing discourses about skin cancer. The pictures predominantly employed an appearance-oriented approach, while the texts adopted a health-oriented lens to portray skin cancer. In addition, H1a and H1b were based on PSE and concerned with the effects of modality when pictures and texts are viewed in isolation.

To test H1a and H1b, a 2 x 2 experimental design was created. The first factor in this experiment was modality (picture, text). The second factor was message-orientation (appearance-oriented, health-oriented). There were two dependent variables, namely attitudes towards tanning
and behavioral intentions of using tanning beds. $H_{1a}$ queried about the impact of modality on participants’ attitudes towards tanning. As such, the dependent variable for $H_{1a}$ was attitudes. $H_{1b}$ queried about the impact of modality on behavioral intentions of tanning in the next three months. As such, the dependent variable for $H_{1b}$ was behavioral intention.

Four experimental materials were created for the experiment, including two pictorial stimuli and two textual stimuli. With the experiment having two factors, four conditions were created to test $H_{1a}$ and $H_{1b}$. Specifically, these conditions included two appearance-oriented messages and two health-oriented messages. All stimuli used in this study were based on the findings from the first study.

Specifically, the visual stimuli were created based on a picture (see Figure 6. in study 1) used in an article published in *Vogue*. To generate a picture-stimuli, the captions and texts that were originally included in the image was removed. Overall, the picture represented a woman sunbathing on a beach. The woman depicted in the picture had a tanned skin. In addition, the woman was in bikini, half-naked, and had all her hair pulled up in a bun. The blue sky was present in the background. Consequently, the picture without original captions was used as the appearance-oriented visual stimulus in Study 2.
Figure 14. Appearance-Oriented Visual Stimulus

Figure 15. Health-Oriented Visual Stimulus
Another visual stimulus (see Figure 15.) was a manipulated version of Figure 14. Signs of sunburn were added on the back and laps of the woman to stress the risks of tanning. The only difference between the two versions of picture was whether there were signs of sunburns on the woman’s back. It served as the health-oriented pictorial stimulus.

The two textual stimuli (see Appendix 1.) were created by the researcher, matched with length and valence. One appearance-oriented textual stimulus was purposefully constructed to stress appearance-based benefits of tanning. For instance, the text indicated that people with a tan usually generate more positive impressions than those without a tan. A health-oriented textual stimulus was created which emphasized on the risks of tanning. For instance, the text informed the readers of the high prevalence of skin cancer and its association with risky UV exposure. The two verbal stimuli were both around 150 characters.

Manipulation checks were performed to find out whether these stimuli conveyed the intended messages. The procedures and results of the manipulation check were reported in the following section of the article.

In addition, drawing upon the findings of the first study, H_{2a}, H_{2b}, H_{3a} and H_{3b} were proposed to further explore PSE in the contexts where both pictures and texts were used to communicate about skin cancer. For instance, the findings of the first study revealed that the pictures and the texts were incongruent in terms of message orientation. Pictures about skin cancer in women’s popular magazines reflected and appeared to endorse the pro-tan norms. However, the accompanying texts focused on the negative health consequences of risky sun exposure, such as sunburns and skin cancers. Little is known about how such incongruent multimodal portrayals of skin cancer impact people’s attitudes and behavioral intentions. Further investigations about the effects of such multimodal messages are warranted.
As such, H$_{2a}$, H$_{2b}$, H$_{3a}$ and H$_{3b}$ queried about the impact of congruency on attitudes and behavioral intentions. A 2 x 2 experimental design was created to test the impact of pictures and texts in the text-picture combination conditions. The experiment included a factor of message orientation (appearance-oriented, health-oriented) and a factor of congruency in message orientation between pictures and texts (congruent, incongruent). The dependent variables were attitudes towards tanning and behavioral intentions of using tanning beds in the next three months.

Specifically, H$_{2a}$ and H$_{2b}$ queried about whether visual messages had greater impact on attitudes and behavioral intentions than words when pictures and texts represented incongruent messages. In addition, H$_{3a}$ and H$_{3b}$ queried about whether conditions with congruent pictorial and textual messages would have greater impact on attitudes and behavioral intentions than conditions with incongruent pictorial and textual messages.

As such, using the same pictorial and textual stimuli created for H$_{1a}$ and H$_{1b}$, four combination conditions with both pictorial and textual stimuli were generated. They were one congruent condition focusing on appearance-oriented message, one congruent condition focusing on health-oriented message, and two incongruent conditions (health-oriented picture combined with appearance-oriented text and health-oriented text combined with appearance-oriented picture).

Consequently, drawing upon the findings of the first study, two 2 x 2 factorial experiments were created to examine the effect of the multimodal portrayal of skin cancer from a perspective of PSE. With two experiments, a total of eight conditions were generated to test PSE in the study.
Participants

The participants were recruited from an undergraduate student sample pool at a large public southern university. Undergraduate students enrolled in introductory communication classes were invited to voluntarily participate in the study. Participants received extra credit points in exchange for their participation. College students were targeted within this study since adults aged between 18 and 34 are the heaviest users of tanning facilities among all age groups in the United States (Heckman, Coups, & Manne, 2008). They are also the age group that has the highest level of sunburns and risks of skin cancer (CDC, 2017). Upon approval of the Institution Review Board (see Appendix 3), the author started to recruit participants for the study.

Procedure

Upon entering the study, participants were provided a description of the study, informing them of the procedures and goals of the research. Then, the participants were asked to give consent and respond to questions measuring their past tanning behaviors, motivations for tanning, and attitudes towards tanning.

Participants were then informed to read a text, a picture or a combination of picture and text about tanning. They were also clearly told about the time they were given to do so. Then, they were randomized to one of the eight experimental conditions. All experimental stimuli were presented on a blank screen. In the picture–text combination and text-only conditions, participants were forced to spend at least 20 seconds viewing the stimuli. This was supported by pilot experiments which showed that it would be long enough to give participants enough time to process the stimuli and short enough that fast readers would not be frustrated. In the picture-only conditions, pictures would appear for 10 seconds. Then, the experiment would automatically progress.
After the participants were exposed to the stimuli, the dependent measures were displayed in following pages of the online experiment, including attitudes towards tanning and behavioral intentions for using tanning beds. Additionally, basic demographic information was also collected, such as age, gender, ethnicity, etc. At the end of the experiment, a briefing was displayed which revealed the purposes of the experiment and relevant information about tanning and prevention of skin cancer.

**Measures**

Participant’s tanning behaviors, sun protection behaviors, attitudes and motivations of tanning were measured prior to stimulus exposure. The two major dependent variables were attitudes towards tanning and behavioral intentions of tanning bed uses. Each dependent variable was measured after participants were exposed to an experiment condition. In addition, basic demographic information (e.g., age, gender, ethnicity, etc.) was also collected after stimuli exposure. These variables were measured using established scales. All the items included in each instrument were included in Appendix 2.

**Indoor and Outdoor Tanning Behavior.** Two items developed by Gillen and Markey (2012) were used to measure indoor and outdoor tanning behaviors. To assess indoor tanning behavior, the participants were asked how often they tan in tanning booths. To measure outdoor sunbathing behavior, participants were asked how often they sunbathe outdoors when the weather is warm. Participants provide responses to both questions based on a seven-point Likert-type scale, where 0 = never, 1 = once per year, 2 = a few times per year, 3 = once per month, 4 = once per week, 5 = a few times per week, and 6 = every day.

**Sun-protective Behavior.** A five-item scale developed by Jackson and Aiken (2006) was used to assess participants’ sun-protective and sunbathing behavior. Participants rated on a
seven-point Likert-type scale from never (1) to always (7) about how often they use sunscreen on their face, wear a hat, stay in the shade when outdoors, and how often they use sunscreen on their body.

**Physical Appearance Reasons for Tanning Scale (PARTS).** This scale was developed by Cafri et al. (2006). The scale was used to assess participants’ physical appearance motivations for tanning. Participants were asked to rate their levels of agreement to a series of statements about their motivations for tanning on a 5-point Likert-type scale from strongly disagree (1) to strongly agree (5) (e.g., Please indicate your level of agreement to the following statement on a scale from 1=strongly disagree and 5=strongly agree. “I tan because it makes me more attractive”). This scale consisted of 24 items.

**Sun Benefit and Sun Risk Attitudes.** Participants’ attitudes about sunbathing were examined by a scale developed by Olson et al. (2008). The participants were asked to rate their level of agreement to a series of statements regarding the benefits or risks of sunbathing a 5-point Likert-type scale from strongly disagree (1) to strongly agree (5) (e.g., Please indicate your level of agreement to the following statement on a five-point scale from 1 = strongly disagree and 5=strongly agree. “Too much sun exposure causes skin cancer”; Please indicate your level of agreement to the following statement on a five-point scale from 1 = strongly disagree and 5 = strongly agree. “Being in the sun is relaxing”).

In the stage of statistical analysis, sun risk attitudes were reverse-coded. As such, higher score indicated more positive attitudes towards tanning. The scale was composed of six items. After viewing the stimulus, participants were asked to answer questions that measure key dependent variable, behavioral intentions for sunbathing and tanning bed use.
**Future Tanning Salon Intentions.** The scale developed by Cafri et al. (2006) was used to assess participants’ future tanning salon intentions, which was a major dependent variable for the experiment. The participants were asked to estimate the times they intend to go indoor tanning (“Please estimate the number of times you plan to use a tanning bed in the next three months”). Participants responded to the items by checking the best option that approximates the range of times they intend to use tanning beds.

**Manipulation checks**

The experimental materials were pre-tested to determine the validity of the manipulation of message features, namely message orientation in pictures and texts. The pretest was conducted prior to the implementation of the experiments. The manipulation check was conducted with different participants than those who participated in the actual experiments.

In the pretest, all participants were exposed to the four experimental stimuli, including an appearance-oriented picture, an appearance-oriented text, a health-oriented picture, and a health-oriented text. Participants for the pretest were invited to complete a manipulation questionnaire after they were exposed to each of the four stimuli.

Specifically, participants were asked to rate their agreement on whether a stimulus material stressed the message it was anticipated to convey on a seven-point Likert-type scale. A seven-point scale measuring health-orientation and a seven-point scale measuring appearance-scale was used to assess the message represented in each stimulus. Each scale consisted of two items respectively (e.g., Please indicate your level of agreement to the following statement on a seven-point scale from 1=strongly disagree and 7=strongly agree. “This image shown below explicitly represents negative impact of tanning on an individual’s health”).

64
To examine the message orientation of each stimuli, an index was created by subtracting each participant’s rating for the health-orientation scale from their rating for the appearance-orientation scale. For instance, a participant was exposed to the appearance-oriented text and gave a rating of one on the health-orientation scale and a rating of seven on the appearance-oriented scale. The index score based on this participant’s responses was generated by subtracting the rating of 1 (rating for the health-orientation scale) from the rating of 1 (rating for the appearance-orientation scale). Consequently, the index score was 6 in this case.

A total of 44 undergraduate students participated in an online survey to assess the effectiveness of the manipulation. The participants in the pretest were different from that in the actual experiments. All participants completed the pretest. Based on the data collected in the pretest, the index scores for each stimulus were reported in Table 2. A series of independent sample T-tests were performed to compare the mean of each experimental stimulus’s index score.

<table>
<thead>
<tr>
<th>Index Score</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance-oriented Text</td>
<td>5.19</td>
<td>0.67</td>
</tr>
<tr>
<td>Health-oriented Text</td>
<td>-4.76</td>
<td>0.89</td>
</tr>
<tr>
<td>Appearance-oriented Picture</td>
<td>5.23</td>
<td>0.71</td>
</tr>
<tr>
<td>Health-oriented Picture</td>
<td>-4.88</td>
<td>0.65</td>
</tr>
</tbody>
</table>

As Table 2. confirms, there were significant differences in the index score between the health and appearance stimuli for both pictures and texts. Specifically, health-oriented text was rated as significantly more health-oriented ($M = -4.76, SD = 0.89$) than appearance-oriented text ($M = 5.19, SD = 0.67, p < 0.01$). In addition, health-oriented picture was rated as significantly
more health-oriented \((M = -4.88, SD = 0.65)\) than appearance-oriented picture \((M = 5.23, SD = 0.71, p < 0.01)\).

**Results**

Participants were randomly assigned to one of the eight experimental conditions to ensure equal distribution. Qualtrics was the online platform used for the online experiment. A random distribution functionality on Qualtrics was used to generate equal distribution. A total of 255 undergraduate students participated in the study. As the participants were invited to take part of the study on a volunteer basis, participants can withdraw from the study voluntarily at any time of the study. In the end, 228 participants completed the experiment and were included in the final sample for analysis.

Overall, the participants aged between 18 and 21 \((n = 216, 94.7\%)\), female \((n = 180, 78.9\%)\), and white \((n = 161, 71.6\%)\). Specifically, 57.9\% \((n = 132)\) of the participants indicated that they never used tanning beds. In addition, 6.1\% \((n = 14)\) of them reported they do not sunbathe when the weather is warm. In addition, 4.8\% \((n = 11)\) of the participants were light users of tanning beds (once per year), 18.5\% \((n = 42)\) moderate users (from once per year to a few times per year), and 11.5\% \((n = 43)\) were heavy users of tanning beds (from once per week to everyday). An independent sample t-test revealed that male participants \((M = 1.24, SD = 0.86)\) used tanning beds less frequently than female participants \((M = 2.57, SD = 1.87); t(223) = -4.62, p < 0.01\).

The participants were equally distributed to the experimental conditions. First, for the four picture- and text-only conditions, the participants were evenly distributed to the four conditions. Participants’ demographic information was reported in Table 3.
As Table 3 confirms, for the two appearance-oriented conditions, both the picture-only and text-only condition had 29 participants. For the two health-oriented conditions, both the picture-only and text-only condition had 29 participants. In each condition, there were generally more females than males. In addition, most of the participants in each of the conditions were Caucasians.

Table 3. Demographic Information of Participants in Picture- and Text-only Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Appearance-oriented</th>
<th>Health-Oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Picture-only</td>
<td>Text-only</td>
</tr>
<tr>
<td>Number of Participants*</td>
<td>29 (25.0%)</td>
<td>29 (25.0%)</td>
</tr>
<tr>
<td>Gender**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>20 (69.0%)</td>
<td>22 (75.9%)</td>
</tr>
<tr>
<td>Male</td>
<td>9 (31.0%)</td>
<td>7 (24.1%)</td>
</tr>
<tr>
<td>Ethnicity**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>4 (13.8%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Caucasian</td>
<td>23 (79.3%)</td>
<td>25 (86.2%)</td>
</tr>
<tr>
<td>Latino</td>
<td>1 (3.4%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3.4%)</td>
<td>0</td>
</tr>
</tbody>
</table>

* The percentage for each condition was calculated based on n = 116.

** The percentage for each category was calculated based on the total number of participants in each condition.

Second, for the combination conditions, the participants were also evenly distributed to the four conditions. Participants’ demographic information was reported in Table 4. As Table 4 confirms, the two congruent conditions had 28 participants per condition. The incongruent condition with health-oriented text and appearance-oriented picture had 28 participants. The incongruent condition with appearance-oriented text and health-oriented picture had 29...
participants. In each condition, there were generally more females than males. In addition, most of the participants in each of the conditions were Caucasians.

Prior to testing the hypotheses, the measurement instruments were subject to reliability assessment. Internal reliability of the measurement scales was assessed using Cronbach’s alpha. Analysis revealed that the internal reliability score for all the scales exceeded 0.75. Cronbach’s alpha coefficients score above .70 suggests acceptable reliability (Nunnally, 1978).

Table 4. Demographic Information of Participants in Combination Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Congruent Conditions</th>
<th>Incongruent Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appearance-oriented</td>
<td>Health-oriented</td>
</tr>
<tr>
<td>Number of Participants*</td>
<td>28 (24.8%)</td>
<td>28 (24.8%)</td>
</tr>
<tr>
<td>Gender**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>19 (67.9%)</td>
<td>24 (85.7%)</td>
</tr>
<tr>
<td>Male</td>
<td>9 (32.1%)</td>
<td>4 (14.3%)</td>
</tr>
<tr>
<td>Ethnicity**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>4 (14.3%)</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Caucasian</td>
<td>23 (82.1%)</td>
<td>24 (85.7%)</td>
</tr>
<tr>
<td>Latino</td>
<td>0</td>
<td>3 (10.7%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3.6%)</td>
<td>1 (3.6%)</td>
</tr>
</tbody>
</table>

* The percentage for each condition was calculated based on n = 113.

**The percentage for each category was calculated based on the total number of participants in each condition.

In addition, the data collected from the experiments was assessed for normality to examine the appropriateness of parametric tests (Bryman & Cramer, 1994). Histograms and Q-Q plots was examined. The histogram revealed an approximately resemblance of a bell-shaped curve. Such visual representation suggested normal distribution of data. In addition to generating
histograms, Q-Q plots were also created to assess normality. If the data is normally distributed, it would form a straight line. The Q-Q plots illustrated that the data points formed or fell close to the center line. Consequently, both the visual representations of the histograms and that of the Q-Q plots indicated normal distribution.

As such, a series of ANOVA analysis were performed to test the hypotheses. Levene’s tests of equality of error variances were performed to examine the homogeneity of variance. The results were not significant at the significance level of .05. As such, factorial ANOVA analysis were appropriate for testing the proposed hypotheses.

H1a posited that, when viewed in isolation, pictures will have stronger impacts on recipients’ attitudinal responses than texts. In the context of health-oriented messages about tanning, there were one text-only condition and one picture-only condition. These two conditions emphasized on the harmful effects of excessive tanning on physical well-beings, such as sunburns and skin cancer.

A factorial ANOVA analysis was conducted to examine the main effects of message orientation and message modality and the interaction between message orientation and modality on attitudes towards tanning. The main effect of message modality was not significant, F(1, 110) = 0.53, p = 0.47, η² = 0.01. The main effect of message orientation was not significant, F(1, 110) = 0.64, p = 0.43, η² = 0.01. More information about the mean scores of attitudes per condition can be found in Table 5. In addition, no interaction effect was found between message orientation and message modality, F(1, 110) = 0.75, p = 0.39, η² = 0.01. Consequently, H1a was not supported.

H1b posited that when viewed in isolation, pictures will have stronger impacts on recipients’ behavioral intentions than the texts in the context of skin cancer. In the context of
health-oriented messages about tanning, there were one text-only condition and one picture-only condition. These two conditions emphasized on the harmful effects of excessive tanning on physical well-beings, such as sunburns and skin cancer.

A factorial ANOVA analysis was conducted to examine the main effects of message orientation and message modality and the interaction between message orientation and modality on behavioral intention for tanning bed uses. The main effect of message modality was significant, $F(1, 110) = 6.57, p < 0.01, \eta^2 = 0.06$. The main effect of message orientation was not significant, $F(1, 110) = 8.45, p = 0.13, \eta^2 = 0.02$. Consequently, $H_{1b}$ was not supported.

Further analyses were performed. An interaction effect was found between message orientation and message modality, $F(1, 110) = 8.45, p < 0.01, \eta^2 = 0.08$. Specifically, in the context of appearance-oriented messages about tanning, picture-only condition ($M = 3.48, SD = 0.31$) triggered greater intentions of using tanning beds than the text-only condition ($M = 1.82, SD = 0.30$). However, as Table 5. confirms, in the context of health-oriented messages about tanning, the picture-only condition ($M = 2.97, SD = 0.30$) did not lead to greater intentions of indoor tanning than the text-only condition ($M = 2.86, SD = 0.30$).

Table 5. Mean Scores of Dependent Variables for Picture- and Text-only Conditions

<table>
<thead>
<tr>
<th>Message Orientation</th>
<th>Modality</th>
<th>Attitudes towards Tanning</th>
<th>Tanning Bed Use Intentions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Appearance</td>
<td>Picture</td>
<td>2.97</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Text</td>
<td>3.23</td>
<td>0.91</td>
</tr>
<tr>
<td>Health</td>
<td>Picture</td>
<td>2.98</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Text</td>
<td>2.95</td>
<td>0.87</td>
</tr>
</tbody>
</table>
Further statistical analysis was conducted for H1b. An ANCOVA analysis revealed that the main effect of modality was not significant, $F(1, 110) = 5.92, p = 0.88, \eta^2 = 0.05$, when appearance-based reasons for tanning was controlled for. This suggested that appearance-oriented pictures had a more salient impact on the behavioral intentions of using tanning beds among participants with higher appearance-based motivations for tanning. In addition, the main effect of modality was not significant, $F(1, 110) = 6.87, p = 0.12, \eta^2 = 0.73$, when previous tanning behaviors was controlled for. This suggested that appearance-oriented pictures had a greater influence on the behavioral intentions of tanning bed use among participants with more frequent uses of tanning beds.

H2a posited that when the picture and the text are incongruent in terms of content, messages presented in the pictures will have more influence on recipients’ attitudinal responses than that presented in texts. The first combination condition of incongruency included a health-oriented text and an appearance-oriented picture. The second condition were incongruent in the reverse direction in terms of message orientation.

Statistical analysis revealed that there was not a significant difference in the scores of attitudes between the first incongruent condition ($M = 3.13, SD = 0.89$) and the second incongruent condition ($M = 3.14, SD = 0.91$); $t(55) = 0.15, p = 0.70$. The mean scores of attitudes collected from the two conditions were also reported in Table 5. As Table 5 confirms, in both conditions, the participants uniformly reported moderately positive attitudes towards tanning. As such, H2a was not supported.

H2b posited that, when the picture and the text are incongruent in terms of content, messages presented in the pictures will have greater influence on participants’ behavioral intentions than that presented in texts. There was not a significant difference in the scores of
attitudes towards tanning between the first condition ($M = 2.95$, $SD = 1.64$) and the second ($M = 2.55$, $SD = 1.33$) condition; $t(55) = 1.08$, $p = 0.30$. The mean scores of behavioral intentions in each condition was reported in Table 6. As Table 6 confirms, participants in all conditions generally indicated they intended to use tanning beds 6-10 times in the next three months. As such, $H_{2b}$ was not supported.

$H_{3a}$ queried that when the picture and the text are congruent in terms of content, they will have larger impact on recipients’ attitudinal responses than those who are incongruent in terms of content. The main effect of picture-text congruency on attitude towards tanning was not significant, $F(1, 111) = 0.44$, $p = .51$. Specifically, as Table 6 confirms, the health-oriented combination condition generated relatively less positive attitudes towards tanning. However, it did not generate statistical significant results for attitudinal responses. Further analysis did not reveal interaction effects. As such, $H_{3a}$ was not supported.

Table 6. Mean Scores of Dependent Variables Per Combination Condition

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Attitudes</th>
<th>Behavioral Intentions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Congruent Health-oriented</td>
<td>1.43</td>
<td>1.72</td>
</tr>
<tr>
<td>Conditions Appearance-oriented</td>
<td>2.91</td>
<td>1.04</td>
</tr>
<tr>
<td>Incongruent Image-Health Text-Appearance</td>
<td>2.99</td>
<td>0.83</td>
</tr>
<tr>
<td>Conditions Image-Appearance</td>
<td>3.13</td>
<td>0.89</td>
</tr>
<tr>
<td>Text-Health</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$H_{3b}$ posited that when the picture and the text are congruent in terms of content, they will have larger impact on recipients’ behavioral intentions than those who are incongruent in terms
of content. In the context of promoting the benefits of tanning, significant differences were found in the scores of behavioral intentions for deliberate sun exposure, $F(3, 111) = 0.68, p = .41$. The mean of behavioral intentions for the corresponding conditions were reported in Table 6. As Table 6 confirms, all combination conditions generated high levels of tanning bed use intentions. Further analysis did not reveal interaction effects. As such, $H_{3b}$ was not supported.

**Discussion**

The findings of the study suggested that pictorial message had greater impact on respondents’ behavioral intentions of tanning bed uses than the texts when pictures and pictures were viewed in isolation. However, such tendency was context-specific and was only observed when appearance-based benefits were promoted. When texts and pictures were both present to convey messages about tanning and skin cancer, a dominant impact of pictures was not observed, especially in situations where the picture contradicts the accompanying text. Instead, participants across conditions uniformly indicated intentions to use tanning beds 6-10 times in the next three months. Overall, the findings did not provide sufficient evidence to support pictorial superiority effect. In addition, competing pictorial and verbal messages were found to increase intentions of tanning bed uses.

In the conditions where pictures and texts were viewed in isolation, pictures produced more powerful impact on respondents’ behavioral intentions of tanning bed use. However, such tendency was only observed when the picture promoted appearance-based benefits of tanning. This is consistent with previous findings.

A recent study by Mays and Tercyak (2015) also found that pictures had greater impact on participants’ indoor tanning intentions than texts when pictures and texts were viewed in isolation. Specifically, the study examined the impact of pictorial and textual stimuli in the
context of reducing indoor tanning behaviors among young women. The stimuli incorporated either a gain-framed or a loss-framed message. The findings revealed that pictorial messages led to significantly greater intentions to quit tanning bed uses than the text-only message in both gain-framed and loss-framed contexts (Mays & Tercyak, 2015).

As the findings from the first study revealed that many appearance-oriented pictures were visually dominant in terms of size and even stood alone, such pictorial representations may impose critical influence on audiences’ behavioral intentions of tanning. With prevalent visual portrayals of tanning in the mass media, the finding may also help to explain why tanning is still a prevalent behavior despite large numbers of health campaigns have been launched in the past decades to reduce risky tanning behaviors.

In addition, when appearance-based reasons for tanning were controlled for, the main effect of modality on indoor tanning intentions was no longer significant. The finding suggested that participants who tan for appearance-based reasons may be more vulnerable to the impact of appearance-oriented pictorial messages than those who do not endorse appearance-based reasons for tanning.

Another important finding was that, while pictures were more effective in promoting behavioral intentions of indoor tanning, such effect was not observed in the condition focusing on health risks of tanning. Future research should continue to explore such interaction effect between modality and message orientation. Specifically, future studies could consider the potential impact of confounding variables, such as believability of messages in the participants.

In the conditions where texts and pictures were both used to convey messages, no significant differences were detected in behavioral intentions for tanning. Moreover, participants across different conditions generally indicated intentions to use tanning beds 6 to 10 times in the
next three months. As the pictorial and visual stimuli were adopted from the findings of the first study, such multimodal portrayals in popular women’s magazines may contribute to increasing intentions of tanning bed uses.

It is important to note that the data collection was conducted in a spring semester. This could be a major limitation of the study and may contributed to students’ greater intentions of using tanning beds in the next 3 months.

Overall, the findings are consistent with the findings from the existing literature. Previous studies found that college students were knowledgeable with the risks of tanning beds and unprotected sun exposure (e.g., Gambla et al., 2015; Knight et al., 2002). However, awareness and knowledge of the harmful effects of indoor tanning usually did not decrease risky tanning behaviors (e.g., Carcioppolo et al., 2017; Noar et al., 2014).

Cognitive dissonance theory and other similar theories were usually used to explain why college students rationalize their risky tanning behaviors despite knowledge of the harmful effects. Cognitive dissonance theory posits that people experience psychological discomfort when their attitudes and behaviors are against one another (Festinger, 1957). Dissonance refers to the psychological experience when people possessed two cognitions that were psychologically inconsistent (Festinger, 1957). The core proposition of CDT was that people strive for cognitive consistency which included the consistency between cognitions, as well as between cognitions and behaviors (Festinger, 1957).

As people are usually cognitively discomfort-averse, people change their attitudes to fit their behaviors or vice versa in order to restore the consistency between attitudes and behaviors (Festinger, 1957). For instance, in a study by Banerjee, Hay and Greene (2012), college students
reported using cognitive rationalizations to justify their engagement of harmful tanning behaviors.

Similarly, in the second study presented in the dissertation, pictures and texts were both present to convey messages about tanning in the four combination conditions. No significant differences were found in participants' attitudinal and behavioral responses. Particularly, when both the picture and the text represented the harmful effects of prolonged tanning, participants reported an average score of 2.82 ($SD = 1.57$) for behavioral intentions of tanning ($2 = 1$ to $5$ times, $3 = 6-10$ times).

In addition to the potential impact of cognitive dissonance, selective exposure may also have played a role. Selective exposure represents a phenomenon where people engage in selective exposure to the information that matches their beliefs (Sears & Freedman, 1967). The premise of such phenomenon is that audience of mass media are active consumers rather than passive recipients of message (Sears & Freedman, 1967).

In the current study, the respondents may have selectively chosen to pay more attention to the message that was consistent with their beliefs. For instance, when text and pictures convey contradictory messages, the participants across conditions ubiquitously indicated high levels of intentions of using tanning beds. In addition, in the context of appearance-oriented messages, pictures were found to promote greater attention of tanning bed uses than texts. However, when controlling for participants’ appearance-based reasons for tanning, no significant differences were found, which suggested that pre-existing motivations greatly impacted the messages.

Research on selective exposure surged in the 1960s but witnessed a decline in the following decades due to critical reviews of the findings that could not support such phenomenon (e.g., Sears & Freedman, 1967). However, with the development of the Internet and mobile
technology, the mere amount of media options in the modern media landscape makes it far easier than in the past to find a diversity of perspectives. Greater amount of media options may further contribute to selective exposure among media consumers. As such, future research could continue to explore the impact of selective exposure in the context of visual and textual communication.

**Revisiting the Theory Of PSE**

In this study, pictorial superiority effect was only identified in the appearance-focused context where the picture and text were viewed in isolation. With an increase of media options and message modalities in the modern communication landscape, continued investigations should be conducted to examine how visuals, texts, and other modalities, such as music, interact with each other in shaping attitudes, beliefs, and behavioral intentions in the context of health communication.

Overall, while PSE was not prevalently identified in the study, the findings did not provide sufficient evidence to falsify PSE. In this study, as well as in most existing studies, the impact of confounding variables need to be controlled for. For instance, gain and loss frames were found to have considerable impact on audiences’ responses to a visual stimulus, especially in attention and message retention. As a result, it is reasonable to assume that if the confounding variables are controlled for, the predictability of PSE may increase.

In the existing literature, evidence disapproving PSE typically leads to a reformulation of the theory or a recognition of necessary conditions, rather than falsifiability. For instance, concerns about the testability of PSE were raised in the literature when evidence not supporting PSE accumulated. For example, fear appeals were found to trigger higher levels of risk-related
perceptions and could increase attention and message recall. However, confounding variables, especially emotion, were not controlled for when comparing the effects of visual and textual messages.

Consequently, the findings supporting PSE could simply be a result based on the biases of image selection. In other words, the testing of PSE is not valid, if confounding variables are not controlled for. One possible contributor to the problem lies in the lack of standard assessment tool for images. However, scholars could use other approaches, such as pretests, to control the impact of biases in image selection. Future studies could explore reliable picture assessment frameworks to enhance the testability of PSE.

While debates abound surrounding PSE, the theory still has substantial strengths. First, the theory is parsimonious. PSE is started based on the notion that people’s memory is extremely sensitive to symbolic messages than words. The concepts included in the theory is concrete and measurable. The relationship between the concepts are simple and parsimonious. As such, with more concerted efforts in research and practices, PSE can be further examined.

Second, in terms of cumulative nature of science, PSE is developed based on the progresses in psychology, physiology, and people’s increasing knowledge of human body. In addition, in terms of heuristic value and aesthetics, PSE is easy to remember and easy to explain.

Third, PSE has high degree of formal development because PSE has been documented in studies in psychology, advertising, health communication, and language learning. For example, in health communication, PSE was consistently observed in people with Alzheimer’s disease and with mild cognition impairment. Moreover, the persuasiveness of pictures was found to be higher than that of verbal messages among people with low literacy and numeracy, such as children and seniors.
Finally, the scope of PSE is also broad. While PSE originally focuses on people’s attention and message recall, the utility of PSE has been extended to message comprehension and behavioral inherence, especially in advertising and health communication. In addition, PSE may also be extended to emotional arousal. For example, fear appeals may be more effective in enhancing attention, comprehension, and retention if presented in pictures than in texts.

Moreover, PSE can be applied to various communicative contexts. For example, PSE can be used to examine not only short-term effects (e.g. attention, comprehension, short-term message recall, etc.) but also long-term effects (e.g. message effect on long-term memory and behavior). In addition, with the development of technology, there are more efficient ways to measure the fundamental concepts in PSE. For example, eye-tracking technology could be used to provide a more accurate measurement of attention. Similarly, some physiological techniques could be used to measure skin moisture levels in order to understand emotional arousals triggered by a visual stimulus. As such, with these tools, testing PSE becomes easier than in the past.

In addition, as the communication in modern societies becomes more and more visual-oriented, PSE may be of particular relevance to visual-dominant media, such as Instagram, Snapchat, and virtual reality applications. While previous studies revealed that PSE has small explanatory power in young adults, the communication patterns may have changed with the emergence of social media, which promote fast-reading and favor attention grabbing messages.

Overall, PSE has substantial theoretical and practical implications in the field of communication, especially in the studies concerning people with low literacy, numeracy and reading ability, such as children, people with cognition impairment, people with Alzheimer’s disease, etc. However, the usage of PSE is practically and theoretically insufficient. Future
studies should pay particular attention to the operational definitions of the core concepts, including attention, message recall, and comprehension. In summary, espousing a perspective of visual-based theories, such as PSE, may serve as a more fruitful way to understand human communication process and media effects.

Limitations and Directions for Future Research

It is important to note that the study has several limitations. One of the major limitations of the study lies in the small sample size. While the participants were predominantly white, female, and aged between 18 and 22, representing the major group at high levels of the risks of skin cancer, this study only used an undergraduate student sample. Future studies could use a larger, more representative sample that include participants with diverse educational backgrounds.

In addition, future studies could examine the intersection of selective exposure and multimodal portrayal of tanning. With an increase in the number of media options, people with different media consumption habit may be exposed to different types of messages of tanning. For instance, visual-oriented consumers may be more likely to use Pinterest and Instagram for tanning and skin-cancer related information, while text-oriented consumers may be more likely to endorse the use of Twitter or online blogs. As such, future studies could examine how preferences of media platforms influence the information retrieved from the media and perceptions of tanning.

Overall, PSE was only witnessed in the appearance-focused condition. Continued exploration of the pictorial superiority effect is warranted to exclude the effects of other factors, such as believability of the messages shaped by previous experience using tanning beds. In addition, the findings also urge a need of innovative message designs for heath interventions and
campaigns for skin cancer since the distorted beliefs about tanning appeared to persistent
and difficult to change. A fundamental change on the societal level may be needed to
change the socially constructed meaning of tanning, which may ultimately change the
health-compromising norms about tanning.
CHAPTER 4 GENERAL DISCUSSION AND CONCLUSION

The overarching goal of the studies presented in the dissertation was two-fold: 1) providing a better understanding of the mediated portrayals of skin cancer by embedding a perspective of visual communication and discourse analysis; 2) exploring more effective message designs by considering both health-focused and socio-cultural realities about tanning.

The findings of the first study revealed that women’s popular magazines represented skin cancer from both a health-oriented and an appearance-oriented lens. The former lens was predominantly presented in the texts, which underscored the negative health consequences of unprotected sun exposure, such as sunburn and skin cancer. In addition, the texts cited credible sources, such as doctors, to inform readers of effective prevention methods of skin cancer. The latter discourse was primarily conveyed in the pictures, which underlined the attractiveness of a tanned appearance and the associated recreational aspects of tanning, such as partying and recreational beach activities.

The findings of the first study informed the experimental design used in the second study. The experiment examined the effects of modality from a perspective of PSE. Overall, the findings of the second study failed to provide sufficient evidence to support PSE. Picture was found to be more powerful than text in shaping behavioral intentions when picture and text were viewed in isolation in the context of appearance-oriented messages. In addition, in combination condition, participants across conditions uniformly reported high levels of intention of using tanning beds in the next three months.
Such findings could further reflect the dominant cultural norms about tanning. As such, while the study failed to support PSE, continued investigation of the pictorial superiority effect is warranted. With the rise of more visual-oriented media platforms, PSE may have important implications in the communication about health issues, such as in the context of stigma and mental illness.

From a perspective of PSE, the findings of the study failed to provide sufficient support. PSE was only observed in the conditions where pictures and texts were viewed in isolation and focused on appearance-oriented content about skin cancer. Specifically, appearance-oriented pictures had greater influence on participants’ behavioral intentions than appearance-oriented texts. In this study, PSE appeared to be context specific. In health-oriented picture-and text-only conditions, PSE was not observed in the study. In addition, one of the key findings from the experiments was that participants across the combination conditions generally reported high levels of indoor tanning intentions.

On one hand, the findings may provide baseline data for the effects of the incongruent multimodal portrayal of skin cancer in women’s popular magazines. The pictorial experimental materials were adopted from an article about skin cancer in a real women’s magazine. Drawing upon the findings from the discourse analysis presented in the first study, the visual and textual discourses surrounding skin cancer in women’s magazines illustrated a competing relationship. The pictures reflected and reinforced the pro-tan norms in the United States. The accompanying texts generally portrayed skin cancer from a lens of health, focusing on the harmful effects of risky sun exposure.

One of the major goals of the experiment was to examine the effects of such incongruent multimodal portrayals of skin cancer. As such, the findings suggested that such incongruent
multimodal representations may promote greater intentions of using tanning beds. For instance, the incongruent condition with appearance-oriented picture appeared to generate the most positive attitudes towards tanning ($M = 3.13, SD = 0.89$), followed by the incongruent condition with health-oriented picture ($M = 2.99, SD = 0.83$).

On the other hand, from a lens of PSE, the finding suggested the impact of potential cofounding variables. First, identification may have impacted participants’ responses. Identification refers to the process in which a person imagines being someone else and behaving like someone else (Wollheim, 1974). In the context of mass communication, identification with media characters refers media consumers responding to characters presented in mediated contexts (Wilson, 1993). In other words, a media consumer images being the character portrayed in the mediated context (Wilson, 1993). The intensity of identification varies depending on the levels of liking and the perceived similarity between the audience member and the presented character (Maccoby and Wilson, 1957).

The human character portrayed in the experimental material was a young white female model. The distance participants felt between them and the model may impact the participants’ perceived level of identification, which may ultimately the participants’ responses (e.g., Newton & Buck, 1985; Newton et al., 1986; Reeves & Miller, 1978). For instance, gender of the participants may shape the perceived distance. Male participants may feel that the risks represented in the pictures were not relevant to them since the character in the media text was a woman. Such identification issues may cause the insignificant results about PSE. Future studies could use different pictures that may increase levels of identification among participants with different genders and ethnicities.
In addition, believability of the message may also have played a role in the experiments. When previous tanning behaviors were controlled, the main effect of modality on behavioral intentions was no longer significant in the context of appearance-oriented messages when the picture and the text was viewed in isolation. This may have suggested that participants who had experiences using tanning beds may not believe the risks of prolonged UV exposure portrayed in the experimental materials. Previous work found that believability played an important role in shaping behavioral intentions in the context of risky health behaviors (e.g., Andrews, Netemeyer, & Durvasula, 1990; Polonec, Major & Atwood, 2009).

For instance, a study by Andrews, Netemeyer, and Durvasula (1990) examined the persuasiveness of different alcohol warning labels. They found that the believability of the labels was significantly associated with people’s attitudes towards the label. Moreover, people with more positive attitudes towards alcohol consumption tended to disbelieve some negative health outcomes illustrated in the warning labels.

Consequently, future research should examine the believability of pictures and texts when examining PSE in the context of skin cancer. As the present study failed to find sufficient support for PSE, continued investigations should be conducted by including more independent variables, such as believability and identification.

**Competing Discourses Surrounding Tanning and Skin Cancer**

The overall findings suggested the complex and interactive relationship between the appearance-oriented discourse and health-focused discourse surrounding tanning and skin cancer. An important question left unanswered from the current study was why participants across different conditions uniformly reported high levels of tanning bed intentions. There may be multiple explanations. In addition to the limitations of the study addressed previously, there
may be other possible explanations. One major factor may lie in the pro-tan norms in the United States.

In the current study, PSE was supported only in the condition when appearance-oriented picture and text were viewed in isolation. In addition, when appearance-based reasons for tanning were controlled for, the main effect of modality was not significant. This finding suggested that appearance-oriented pictures imposed more powerful influence on more appearance-conscious young adults. Selective exposure may help to explain such findings. However, it can not help to explain why participants from different conditions reported moderately high levels of tanning intentions.

The high levels of tanning bed use intentions identified across the combination conditions may derive from appearance-based motives of tanning. Previous research found that, despite knowledge about relevant risks, people continue to engage in risky tanning behaviors. For instance, prevention programs were found to be effective in enhancing the knowledge about skin cancer (e.g., Dixon, Dobinson, Wakefield, Jamsen, & McLeod, 2008; Dobbinson et al., 2008). However, previous studies also found that many people continue to engage in risky UV exposure despite knowledge about negative health consequences (Dixon, Dobinson, Wakefield, Jamsen, & McLeod, 2008; Dobbinson, et al., 2008).

Despite numerous educational efforts, a study conducted in 2015 and using national sample reported that sunburns were still highly prevalent in U.S. adults (Holman et al., 2018). Specifically, 34.2% of the 31,162 respondents reported having experienced sunburn in 2015. The prevalence of sunburn was the highest in younger adults, who aged between 18 and 29. People who use sunless tanning products were also found to be more likely to experience sunburn compared with respective comparison groups. Another interesting finding from this study was
that sun avoidance behaviors, such as wearing long-sleeve clothes, were also significantly associated with lower levels of sunscreen uses. As such, educational programs focusing on increasing the knowledge about the harmful effects of risky UV exposure may not be effective in generating UV protection behaviors in the long run.

Even in community-based intervention programs, such trends were documented. In a study by Jones, Oh, Corkery, Hanley, and Egan (2007), assessment of participants’ knowledge about skin cancer suggested that they were well educated on the harmful effects of unprotected sun exposure. In addition, the researchers created an experiment to examine the impact of educational programs on participants’ attitudes towards sun protection. Participants were invited to a dermatology clinic and be a part of a study group where an information sheet highlighting the causes, misconceptions, and protective strategies of skin cancer were distributed.

In addition to the information sheet, doctors were present to provide verbal information about skin cancer. The doctor-based educational programs generated an increase in participants’ knowledge about skin cancer but failed to increase sun-protective attitudes. The desire to have a tan was still high, especially in women (Jones, Oh, Corkery, Hanley, & Egan, 2007).

Such trends can also be observed in other health-related behaviors, such as smoking. For instance, a study by Yang and Bissell (2017) examined smoking behaviors and motivations in college students. They found that more than 70% of the smokers were social smokers, who only smoke in social gatherings and with the presence of other people. In other words, smoking served as way to construct personal identities and help form social relationships. In the case of social smoking, the perceived salience of social rewards appeared to surpass the importance of physical well-being, at least temporarily, in the context of social smoking norms on U.S. campuses.
Numerous theoretical frameworks, such as the theory of planned behavior (Ajzen, 1985) and the health belief model (Rosenstock, 1966), were used to explain why people engage in health compromising behaviors. These theories conceptualize health behaviors from a lens of cognitions that reflect perceived benefits, costs, and ability to carry out a health behavior.

For instance, the theory of planned behavior was first proposed by Ajzen in 1985. It has been extensively employed and tested to predict and explain a wide variety of health behaviors (Tyson, Covey & Rosenthal, 2014). Moreover, the TPB also served as a powerful framework for developing interventions for risk health behaviors (Sutton, 2002). According to the TPB, behavioral intention was identified as a motivational trigger that would potentially result in an individual’s involvement of a particular behavior (Ajzen, 1985).

Intention was guided by three factors: attitude toward the behavior, perceived social norms, and perceived behavioral control (PBC) (Ajzen, 2006). Attitudes toward the behavior could be either favorable or unfavorable beliefs about the outcomes of particular behaviors (Ajzen, 2006). Perceived social norms derived from normative expectations from others and/or the society and the individual’s motivation to comply with such expectations (Ajzen, 2006). Finally, even if an individual possessed sufficient intention to conduct a particular behavior, other external factors could add difficulties or limitations to the execution of such behavior, such as time, money, etc. (Ajzen, 1985).

Therefore, perceived behavioral control was included in the TPB and examined the degree of control that an individual perceived to have over the behavior (Ajzen, 1985). In summary, the three kinds of beliefs influenced the formation of intention, which was “assumed to be the immediate antecedent of behavior” (Ajzen, 2006, p.1).
While TPB has been applied in various health communication contexts, a recent meta-analysis of the TPB reported that TPB was found to have adequate predictive power of intention (35 out of 46 research identified significant prediction of intention), but relatively weak predictive power of behavior (17 out of 51 studies found significant prediction of behavior) (Hobbs, Dixon, Johnston, & Howie, 2013).

The discrepancy between intention and behavior may be explained by a mediating effect of socio-cultural factors. In many cases, health behaviors, such as smoking and tanning, are not just health behaviors but also social behaviors that correlate with larger socio-cultural norms and the construction of personal identities. Previous work highlighted the salience of appearance in triggering health-compromising behaviors.

An individual’s desire to appear physically attractive to others may outweigh the concerns about the negative effects of risky health behaviors. For instance, a recent study by Hill and Durante (2011) employed priming conditions to illustrate the impact of attractiveness-related goals on women’s desire to engage in health-compromising behaviors. In the study, women reported greater intention of getting a tan and taking dangerous weight-loss pills after they were exposed to experimental stimuli that highlighted the salience of physical attractiveness.

In this research project presented in the dissertation, when situating tanning in a larger socio-cultural discourse about gender and symbolic representations of socio-economic status, tanning can also be regarded as a social behavior that can be used to construct personal identities and manage social relationships.

The awareness of the harmful effects of risky UV exposure may help an individual to counterargue pro-tan norms. However, when the perceived salience of the social rewards of
tanning surpasses the importance of physical health, people may participate in risky tanning behaviors, despite their awareness of the harmful effects of risky UV exposure.

In addition to an increase in attractiveness, other social rewards may also encourage people to engage in risky tanning behaviors. For example, indoor tanners believe that tanning lead to greater social acceptance (Noar, Myrick, Morales-Pico, & Thomas, 2014). Consequently, tanning may also serve as a useful strategy to temper negative feelings associated with body dissatisfaction and social rejection.

For instance, the correlation between bullying victimization and body shape contributed to the endorsement of tanning among adolescents (e.g., Blashill & Traeger, 2013). In a study focusing on adolescent males, respondents with more negative perceptions of body shape reported greater intentions of tanning in response to perceived risks of being bullied by peers (Blashill & Traeger, 2013). In this case, tanning was fundamentally used as a method to decrease risks of bullying (Blashill & Traeger, 2013). As such, appearance-enhancement goals may also be triggered by peer pressure and risks of bullying among adolescents.

Summarizing the mentioned above, despite their good knowledge of the risks of tanning, people continue to engage in risky UV exposure behaviors (Olson et al., 2008). Beyond the context of tanning and skin cancer, appearance-based factors also triggered other health damaging behaviors in the presence of good knowledge about relevant risks. For instance, similar trends were also found in risky weight-losing behaviors (Nasser, 1988; Bish et al., 2005).

As such, the perceived importance of behaviors and relevant outcomes may be more salient in shaping people’s decision making than knowledge. A previous meta-analysis found that behavior type explained 19% of the variances in the causal relationship between intention (impacted by knowledge and attitudes) and behavior (Randall and Wolff, 1994). A recent meta-
analysis also reported that behavior type significantly influenced the strength of association between intention and behavior (McEachan et al., 2011).

Future studies could continue to explore the impact of perceived importance of health behaviors and relevant outcomes. Such assessment may contribute to a better understanding about how people make health-related and appearance-related decisions. For instance, the importance of different health behaviors was measured through a seven-point scales from not at all important to extremely important in a study conducted by Knobloch-Westerwick, Johnson, and Westerwick (2013), although the study did not provide a concise conceptual framework for the concept. Future studies could develop clearer definitions and more reliable instruments to measure the concept.

In addition to appearance-based motives, other factors may also have played a role. For instance, an individual’s past behavior or habit could spur the individual to irrational behaviors due to self-bolstering effect (Knobloch-Westerwick, Johnson & Westerwick, 2013). Past behavior and habit can hinder people’s involvement in particular desirable health behaviors (See Hagger, Chatzisarantis, & Biddle, 2002 for a systematic review). Furthermore, past behavior and habit were found to be the best predictor of future behavior (e.g. Bagozzi & Kimmel, 1995; Norman & Smith, 1995).

The findings from the present study also suggested such self-bolstering effect. For instance, when previous tannin behaviors were controlled for, the main effect of modality on tanning bed use intentions was no longer significant. This suggested that participants who were frequent tanners tended to be more vulnerable to appearance-oriented pictures than non-tanners or those how use tanning beds less frequently. As such, future intervention programs could use a comprehensive approach by situating tanning behaviors in a context of complex human
interactions, which may encompass concepts such as peer pressure, self-bolstering, social reward, and self-esteem.

Summarizing the discussed above, findings from previous work suggested that the perceived temporary benefits could outweigh perceived risks of tanning. That may help to explain the continued prevalence of risky tanning behaviors in the United States. In addition, the sociocultural aspect of a health behavior may help to explain why certain message designs failed to generate intended effects. For instance, a meta-analysis on gain- and loss-frames found no statistically significant difference in persuasiveness between the two types of messages for encouraging sun safe behaviors (O’Keefe & Jensen, 2007). Future intervention programs for tanning and skin cancer should focus more on changing perceptions about the importance of appearance and the socially constructed meaning of a tanned look.

In addition, the way in which how health-related information were covered in the media also played an influential role in shaping people’s perceptions, intentions and behaviors towards health-related issues (Hoffner & Ye, 2009). For instance, news coverage about celebrity with cancer was perceived as misleading and could attract significant higher amount of attention to a specific and random type of cancer (Jensen, Moriarty, Hurley, & Stryker, 2010).

Drawing on the findings of the first study, the texts and pictures failed to provide substantive information on incidence and mortality rates about skin cancer. The finding from the first study was consistent with that from previous research. For instance, news coverage generally failed to provide statistics of the incidence rates and mortality rates public (Jensen, Moriarty, Hurley, & Stryker, 2010). Several content analysis studies were conducted to compare the number of health issues covered in the media and their actual incidence and mortality rates.
One latest comprehensive content analysis about this issue was conducted by Slater, Long, Bettinghaus, and Reineke (2008). Newspapers, news magazines, newscasts in the United States were included as three major types of media to be examined (Slater et al., 2008). Breast cancer, brain cancer, and leukemia cancer were found to be overreported in newspaper coverage compared to both incidence and mortality rates in the society (Slater et al., 2008). However, lung cancer and lymphoma cancer were found to be underreported in newspaper coverage compared to both incidence and mortality rates (Slater et al., 2008).

In terms of the amount of coverage, findings from the first study suggested that little attention was devoted to skin cancer in women’s popular magazines. Only 29 articles discussed skin cancer in the more than 200 issues published between 2014-2016. While such little coverage of skin cancer can be concerning, but it may not be a surprising finding. In an analysis of newspaper coverage of skin-cancer-related issues, Lovejoy (2002) maintained that newspaper coverage of skin cancer was not sufficient in general. Specifically, specific methods for sun protection were not always mentioned and none of the primary preventative methods were particularly covered in the articles focusing on skin cancer prevention (Lovejoy, 2002).

Consequently, health journalists and magazines editors could help to combat the epidemics of skin cancer by including more information that can help people counterargue the pro-tan norms.

**Theoretical and Practical Implications**

Methodologically, the research project presented in the dissertation employed mixed methods. The first study embraced a perspective of multimodal discourses analysis to examine how pictures and texts interactively constructed the meanings of skin cancer in women’s popular magazines. The findings of the first study suggested a competing relationship between the
pictorial and textual representations of skin cancer. To examine the effects of such mediated portrayals, an experimental design was created and presented in the second study. Such methodological approach has primarily two advantages.

First, since the mass media play an important role in shaping public health beliefs and behaviors, findings of discourse analysis could provide a more solid foundation for experimental designs examining media effects. One of the most prominent influences within an individual’s social environments is media use. The descriptive nature of discourse can help researchers identify the messages people are exposed to on a daily basis. Compared with messages delivered in one-time health campaigns or intervention programs, messages in the media may have more enduring and profound impact on people’s health beliefs, decisions making about health care, and health behaviors.

Consequently, with an up-to-date understanding about the portrayals of skin cancer in the media, researchers could create experimental designs that are more relevant to people’s health decisions and behaviors, instead of relying heavily on traditional theoretical frameworks, such as gain and loss frames.

Second, using mixed methods, both the sociocultural and the absolute realities about health behaviors can be explored. The findings of the second study did not provide substantial support for PSE – the primary theoretical framework used for the experimental design. The findings of the first study could help to explain why PSE was not identified in the second study. Specifically, experimental designs could provide absolute realities about whether a specific message design could generate the intended attitudes and behaviors. However, statistical analysis in an experimental design can only provide support for why a type of message worked but not for why a message failed to generate intended effects.
Summarizing the stated above, people’s health-related behaviors may not be rational, but also relied on an individual’s desire (Cameron, 2010; Lawton, Conner, & McEachan, 2009; Lawton, Conner, & Park, 2007). Consequently, actions on the societal and cultural level may be necessary in generating desirable attitudes and behaviors by changing people’s desires and perceived norms about tanning. Such change may need consistent and collective efforts from the society.

For instance, the comprehensive skin cancer prevention program, the SunSmart campaign in Australia has witnessed a decline in public endorsements of a dark tan (Dobbinson et al., 2008). The SunSmart was supported by the Australian state of Victoria on a consistent and enduring basis, which helped the program to become a systemwide health promotion program (Dobbinson et al., 2008). The collective efforts derived from the state, the media, the academia, and many other relevant organizations contributed to generating more healthy attitudes towards a tanned skin.

Specifically, the SunSmart campaign has been run in the state of Victoria in Australia for more than 20 years. Compared with some prominent campaigns in the United States, the SunSmart campaign was longer-running, which may contribute to cultivating a more enduring impact on the public’s perceptions about a tanned look. Drawing upon a perspective of cultivation theory, repeated exposure to media portrayals shape people’s perceptions in the direction of the media themes (Gerbner, Gross, Morgan, & Signorielli, 1994). A review of the implementation of the SunSmart campaign also suggested that the strong consistency and continuity served as a key foundation for the success of the health promotion program (Montague, Borland, & Sinclair, 2001).
The current policies about indoor tanning have also been criticized for their ineffectiveness in reducing indoor tanning. For instance, a recent study examining the current state law on indoor tanning revealed that 86.2% of the sampled tanning facilities required parental signature (Mayer, et al., 2011). However, many facilities failed to comply with youth-access laws (Mayer et al., 2011).

Evidence suggests that indoor tanning in early ages could increase the risks of developing melanoma by 75% in later life stages (International Agency for Research on Cancer Working Group on Artificial Ultraviolet Light and Skin Cancer, 2007). High levels of indoor tanning use among U.S. adolescents are critically alarming (Cokkinides, Weinstock, O'Connell, & Thun, 2002). In addition, living close to a tanning facility was also a significant predictor for tanning bed uses (Mayer et al., 2006). As such, if a change on the cultural level may not take place soon, changes on the policy level may help to decrease tanning bed uses, especially in adolescents. For instance, following examples of Australia and some European countries, bans for underage tanning bed uses are likely needed (Mayers et al., 2006).

In addition, emphasizing on the salience of physical well-being may be a potentially effective approach to address risky health behaviors. For instance, the study on social smoking by Yang and Bissell (2017) found that the perceived importance of health was significantly lower in social smokers than in non-smokers. With higher levels of perceived importance of health may help people to counterargue cultural norms that promote risky health behaviors. If societal changes are challenging, future intervention programs and health campaigns could emphasize on the salience of physical health to seek changes on the individual level.

Salience of physical well-being may also be especially relevant with the rise of various tanning products. In the current market, a variety of alternative methods of achieving a tanned
look may be readily usable, such as sunless tanning spray and lotion. Sunless tanning products were found to be promoted more predominantly than ultraviolet tanning (Ricklefs et al., 2006). However, sunless tanning products did not seem to be effective in decreasing risky tanning behaviors. A pilot study involving 121 users of sunless tanning treatment revealed little intention in changing their sun exposure behaviors and sunscreen uses (Sheehan & Lesher, 2005). A more recent national survey in the United States also reported similar trends (Stryker, Yaroch, Moser, Atienza, & Glanz, 2007).

As tanning was essentially constructed as an appearance-related concept in the United States, alternatives of ultraviolet tanning behaviors, such as sunless lotion, may potentially heighten the obsession of the tanned ideal. Researchers suggested to focus on changing the cognitions about appearance and body image, rather than seeking alternatives for ultraviolet tanning.

For instance, Yoo and Kim (2017) conducted a study examining the relationship between tanning, weight management and plastic surgery. Both ultraviolet and sunless tanning behaviors were examined. Overall, they found that these three behaviors were intercorrelated. In addition, an endorsement of a tanned look served as a distal risk factor for risky body-modifying behaviors. As such, changing the pro-tan norms may have more enduring and healthier impact on people’s behaviors.

Overall, the research project presented in the dissertation shed lights on the multimodal portrayal of skin cancer in women’s popular magazines and their effects on attitudes and behavioral intentions of tanning. While the second study was limited in the strength and nature of the conclusions with small sample size, it provided baseline indicators of the impact of modality and important directions for future research.
Future studies should continue to explore the impact of modality on attitudinal and behavioral responses from a perceptive of PSE. While the study presented in this dissertation did not provide sufficient evidence to support PSE, the findings was not sufficient to falsify PSE. Future studies could examine additional factors to control the impact of potential confounding variables, such as believability of the message, perceived importance of behaviors, and developing more reliable assessment tool for visual communication.
REFERENCES


**APPENDIX 1. TEXTUAL STIMULI**

<table>
<thead>
<tr>
<th>Health-oriented Textual Stimuli</th>
<th>Appearance-Oriented Textual Stimuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>You won’t read “wear broad-spectrum SPF 30 daily!” here, because by now, you know you should. Still, you may need a reminder of why this habit is so important. Some eye-openers: “up to 90 percent of skin cancers are associated with UV exposure,” says Elizabeth Hale, MD, a clinical associate professor of dermatology at the NYU Langone Medical Center. One in five Americans will be diagnosed with skin cancer which includes deadly melanoma-in their lifetime.</td>
<td>Many people sunbathe under the assumption that it makes them more attractive. A recent study has confirmed this long-standing premise. In a recent survey of 7100 women and men nationwide, 72% expressed that they find tanned people more attractive. Who wouldn’t want a glowing or shinning skin? Apparently, the prettiest skin in summer just glows. A tan can help to conceal skin imperfections, make you look sexier, thinner, and more attractive.</td>
</tr>
</tbody>
</table>
APPENDIX 2. INSTRUMENTS USED IN STUDY 2

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you tan in tanning booths?</td>
<td>1 = never</td>
</tr>
<tr>
<td></td>
<td>2 = once per year</td>
</tr>
<tr>
<td></td>
<td>3 = a few times per year</td>
</tr>
<tr>
<td></td>
<td>4 = once per month</td>
</tr>
<tr>
<td></td>
<td>5 = once per week</td>
</tr>
<tr>
<td></td>
<td>6 = a few times per week</td>
</tr>
<tr>
<td></td>
<td>7 = every day</td>
</tr>
<tr>
<td>2. Please indicate the number of hours you spent in</td>
<td>1 = never</td>
</tr>
<tr>
<td>sunbooth/tanning bed during the past week.</td>
<td>2 = 1–2 hr/wk</td>
</tr>
<tr>
<td></td>
<td>3 = 3–4 hr/wk</td>
</tr>
<tr>
<td></td>
<td>4 = 5–7 hr/wk</td>
</tr>
<tr>
<td></td>
<td>5 = 8–10 hr/wk</td>
</tr>
<tr>
<td></td>
<td>6 = 11–15 hr/wk</td>
</tr>
<tr>
<td></td>
<td>7 = 16–20 hr/wk</td>
</tr>
<tr>
<td></td>
<td>8 = 21–25 hr/wk</td>
</tr>
<tr>
<td></td>
<td>9 = more than 25 hr/wk</td>
</tr>
<tr>
<td>3. How often you sunbathe outdoors when the weather is warm.</td>
<td>1 = never</td>
</tr>
<tr>
<td></td>
<td>2 = once per year</td>
</tr>
<tr>
<td></td>
<td>3 = a few times per year</td>
</tr>
<tr>
<td></td>
<td>4 = once per month</td>
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<tr>
<td></td>
<td>5 = once per week</td>
</tr>
<tr>
<td></td>
<td>6 = a few times per week</td>
</tr>
<tr>
<td></td>
<td>7 = every day</td>
</tr>
<tr>
<td>4. During the past week, how often had you used SPF 15_sunscreen on your</td>
<td>1 = never</td>
</tr>
<tr>
<td>face?</td>
<td>2 = very rarely</td>
</tr>
<tr>
<td></td>
<td>3 = rarely</td>
</tr>
<tr>
<td></td>
<td>4 = occasionally</td>
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<tr>
<td></td>
<td>5 = frequently</td>
</tr>
<tr>
<td></td>
<td>6 = very frequently</td>
</tr>
<tr>
<td></td>
<td>7 = always</td>
</tr>
<tr>
<td>5. During the past week, how often had you worn a hat?</td>
<td>1 = Definitely Disagree</td>
</tr>
<tr>
<td></td>
<td>2 = Mostly Disagree</td>
</tr>
<tr>
<td></td>
<td>3 = Neither Agree Nor Disagree</td>
</tr>
<tr>
<td></td>
<td>4 = Mostly Agree</td>
</tr>
<tr>
<td></td>
<td>5 = Definitely Agree</td>
</tr>
<tr>
<td>6. During the past week, how often had you stayed in the shade when</td>
<td>1 = Definitely Disagree</td>
</tr>
<tr>
<td>outdoors?</td>
<td>2 = Mostly Disagree</td>
</tr>
<tr>
<td></td>
<td>3 = Neither Agree Nor Disagree</td>
</tr>
<tr>
<td></td>
<td>4 = Mostly Agree</td>
</tr>
<tr>
<td></td>
<td>5 = Definitely Agree</td>
</tr>
<tr>
<td>7. During the past week, how often had you used SPF 15_sunscreen on your</td>
<td>1 = Defined Disagree</td>
</tr>
<tr>
<td>body?</td>
<td>2 = Mostly Disagree</td>
</tr>
<tr>
<td></td>
<td>3 = Neither Agree Nor Disagree</td>
</tr>
<tr>
<td></td>
<td>4 = Mostly Agree</td>
</tr>
<tr>
<td></td>
<td>5 = Definitely Agree</td>
</tr>
<tr>
<td>(Continued on the next page)</td>
<td></td>
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</tbody>
</table>
Please indicate the extent to which you agree with the following statements.

13. Too much sun exposure causes skin cancer  1 = Strongly Disagree
14. I tan because it makes me more attractive.  2 = Somewhat disagree
15. I tan because it makes me look better.  3 = Neutral
16. I tan because it makes me more confident in my appearance.  4 = Somewhat agree
17. The tanner I am, the more attractive I feel.  5 = strongly agree
18. Having a tan gives me more sex appeal.
19. I wish I had a tan like the people on TV.
20. I want to be as tan as people in magazines.
21. I try to be as tan as people in movies.
22. I would like my skin tone to be darker like people in TV and movies.
23. I try to have a tan like famous people I see in magazines.
24. I wish I was as tan as celebrities in the media.
25. I try to get a tan because my family members say it is attractive.
26. I want to be tan because my family members think it makes me look healthier.
27. I want a tan because people in my family think it makes my skin look nice.
28. A tan gives my body the appearance of having more muscle tone.
29. A tan helps me look like I’m in good physical shape.
30. I tan because it helps me look in shape.
31. I look like I have less fat on my body when I am tan.
32. The more tan I am, the more physically fit I look.
33. I tan because it helps reduce the amount of acne on my face and body.
34. Tan skin helps me cover up acne-related scars.
35. I tan before a big social event because it helps reduce the appearance of acne.
36. The less tan I am, the more I’m worried about my acne showing.
37. When I am tan, I feel less concerned about the appearance of acne.
38. I don’t tan because it will age my skin quicker.
39. I’m hesitant to tan because it will wrinkle my skin.
40. I don’t tan as much as I would like because I’m worried about premature skin aging.

41. Please estimate the number of times you plan to use a tanning bed in the next three months
   1 = 0 time
   2 = 1–5 times
   3 = 6–10 times
   4 = 11-15 times
   5 = 16-20 times
   6 = 21-25 times
   7 = more than 25 times

(Continued on the next page)
| Please estimate the number of times you plan to sunbathe in the next three months. | 1 = 0 time  
2 = 1–5 times  
3 = 6–10 times  
4 = 11–15 times  
5 = 16–20 times  
6 = 21–25 times  
7 = more than 25 times |
| Please estimate the number of times you plan to sunbathe in the next twelve months. | 1 = 0 time  
2 = 1–10 times  
3 = 11–20 times  
4 = 21–30 times  
5 = 31–40 times  
6 = 41–50 times  
7 = 51–60 times  
8 = 61–70 times  
9 = 71–80 times  
10 = 81–90 times  
11 = 91–100 times  
12 = more than 100 times |
APPENDIX 3. IRB APPROVAL

THE UNIVERSITY OF
ALABAMA
Office of the Vice President for
Research & Economic Development
Office for Research Compliance

May 17, 2018

Shuhua Zhou, Ph.D.
Professor & Associate Dean for Graduate Studies
College of Communication & Information Sciences
University of Alabama
Box 870172

Re: IRB # 16-OR-084-R2 "The Effects of Visual and Textual Message on People’s Attitudes toward Skin Cancer"

Dear Dr. Zhou:

The University of Alabama Institutional Review Board has granted approval for your proposed research. You have also been granted the requested waiver of documentation of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on May 16, 2019. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Study Closure Form.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

[Signature]

Carriann M. Myles, MSM, CIP
Director & Research Compliance Officer
Office for Research Compliance

358 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127
205-348-8461 | fax 205-348-7189 | Toll Free 1-877-820-3066

118