Sun Exposure, Tanning Beds, and Herbs that Cure: An Examination of Skin Cancer on Pinterest

To appear in *Health Communication*

Lu Tang, PhD (Corresponding author)
Department of Communication Studies
College of Communication and Information Sciences
University of Alabama
Email: ltang1@ua.edu

Sung-Eun Park, MA
College of Communication and Information Sciences
University of Alabama
Email: park025@crimson.ua.edu
Abstract

Skin cancer is the most common cancer affecting the U.S. population. Pinterest.com, a virtual bookmarking social media site, has the potential to disseminate skin cancer related information among young women, the group with the fastest increase in skin cancer diagnosis. This paper presented a quantitative content analysis of pins about skin cancer on Pinterest guided by agenda setting theory and health belief model. Overall, sun exposure and tanning beds were most frequently discussed as the causes of skin cancer and alternative therapies such as herbal medicine were discussed more than traditional biomedical treatment or prevention. Highly repined pins tend to include more information than regular pins. Different types of skin cancer (melanoma, squamous-cell carcinoma and basal-cell carcinoma) received the same amount of coverage; however, pins about non-melanoma skin cancer (such as squamous-cell carcinoma and basal-cell carcinoma) were often information-poor. They were less likely to include information on the causes, prevention, and the biomedical treatment of skin cancer and were less likely to include health belief constructs associated with the promotion of skin cancer prevention and treatment.
Sun Exposure, Tanning Beds, and Herbs that Cure: An Examination of Skin Cancer on Pinterest

In the last three decades, more people in the United States are diagnosed with skin cancer than those who are diagnosed with all other types of cancer combined (American Cancer Society, 2015a). It is estimated one in five Americans will develop skin cancer in his lifetime (National Cancer Institute, 2014a). Among different types of skin cancers, melanoma is the most deadly, yet the least prevalent. The American Cancer Society (2015a) estimated 73,870 new cases of melanoma in 2015 and 9,940 deaths from it. Non-melanoma skin cancers, such as basal-cell carcinoma and squamous-cell carcinoma, are much more prevalent but usually curable. It is estimated that 5.4 million cases of non-melanoma skin cancer were diagnosed among 3.3 million people in 2012 (Rogers, Weinstock, Feldman, & Coldiron, 2015). Historically, melanoma has been most common among older individuals, especially older men; however, recent epidemiological studies have demonstrated the rise of melanoma among young people. In fact, today melanoma is the most common cancer among young adults between 25 and 29 and the second most common type of cancer among adolescents and young adults between 15 and 29 (National Cancer Institute, 2014b). Compared to young men, young women are subject to a heightened risk of melanoma because the latter are more likely to expose themselves to risk factors such as sunburn and tanning beds (Ting, Schultz, Cac, Peterson, & Walling, 2007). Compared to their peers of other races, young Caucasian women face the highest risk of skin cancer (National Cancer Institute, 2014a).

Skin cancer is preventable and often curable if detected early. According to American Cancer Society (2014), 3 million cases of skin cancer could be prevented every year if people avoid the risk factors associated with UV light exposure. Hence, it is of paramount importance to communicate the risks of skin cancer and methods of prevention to those who are at high risk.
The Internet and social media could serve as an important source of health information about skin cancer, especially for young adults (Hay, Coups, Ford, & DiBonaventura, 2009). However, past research has shown skin cancer information online to be incomplete or inaccurate (e.g. Bichakjian et al., 2002). For example, Bhavnani (2003) found great disparity in the quality of webpages addressing melanoma, with most webpages only providing a few facts about the disease.

Of particular interest to the dissemination of skin-cancer related information is Pinterest--a visual bookmarking site with 100 million monthly users as of September, 2015 (Kastrenakes, 2015). According to a report produced by the Pew Research Center (2015), Pinterest is the third most popular social media site after Facebook and LinkedIn. Health is an important topic on Pinterest. Communication scholars have begun to examine the coverage of a variety of health topics on Pinterest, including depression (Guidry, Zhang, Jin, & Parrish, 2015), chronic obstructive pulmonary disease (COPD) (Paige, Stellefson, Chaney, & Alber, 2015), and vaccines (Guidry, Carlyle, Messner, & Jin, 2015). Users of Pinterest are likely to be female, young, and white (Pew Research Center, 2015). Because of the unique demographic characteristics of its users, Pinterest is an ideal platform for health education about skin cancer to young women. The current study provided a comprehensive overview of the types and characteristics of information about skin cancer on Pinterest though a content analysis guided by theory of agenda setting and health belief model (HBM).

**Literature Review**

**Agenda Setting**

First-level agenda setting refers to the process through which media shapes the public’s perception of the importance of different issues by highlighting certain issues while downplaying
others (McCombs & Shaw, 1972). Increased coverage of a disease or health risk in the media often leads to heightened public awareness of the issue (Yanovitzky, 2002). Different types of skin cancer, including melanoma, squamous-cell carcinoma, and basal-cell carcinoma, are associated with different morbidity and mortality rates. Non-melanoma skin cancers such as basal-cell carcinoma and squamous-cell carcinoma are the most common, but they rarely spread to other parts of the body and are usually curable. Melanoma only accounts for 2% of all cases of skin cancer, but it will metastasize if not caught early and it causes the most deaths (National Cancer Institute, 2014b). Melanoma skin cancer has received much more attention in the media than non-melanoma skin cancers. A study on skin cancer coverage in *The New York Times* from 1980 to 2004 found that 37% of the articles mentioned skin cancer in general without a specific reference to either melanoma or non-melanoma types. Furthermore, 29% of the articles focused solely on melanoma, whereas only 7% of the articles contained information about basal-cell carcinoma and only 3% of articles addressed squamous-cell carcinoma (Heneghan, Hazan, Halpern & Oliveria, 2007). While it is important to inform the public about the risks of skin cancer in general, the overemphasis or under coverage of any specific type of skin cancer could be problematic. Hence, the first research question (RQ1) is proposed.

*RQ1: To what extent are different types of skin cancer covered in Pinterest?*

Second-level agenda setting or framing refers to the process by which media influence how the public thinks about a certain issue (Entman, 1993). In the context of media coverage of health, several dimensions of framing have been emphasized, including cause framing and solution framing. Cause framing refers to how media explain the causes of a disease (Entman, 1993). When media frame a disease as caused by controllable factors (e.g. diet) instead of uncontrollable factors (e.g. genes), they could increase the audience’s perceived behavioral
control, which in turn makes them more likely to change their behaviors (Ajzen, 2002).

Solution framing includes two aspects: the discussion of prevention and the discussion of treatment. The discussion of prevention is especially important since skin cancer is highly preventable. Recommended methods of skin cancer prevention include: using sunscreen, avoiding tanning bed, wearing protective clothing, and seeking shade (Cho, Hall, Kosmoski, Fox, & Mastin, 2010). In addition, American Cancer Society (2015b) also recommends secondary prevention or early detection as another defense line against skin cancer, which includes methods such as self-examination or examination by a dermatologist. Media discussions of different methods of prevention increase audiences’ awareness of different risk factors and encourage them to adopt preventative behaviors. For instance, in studying pro-sun-protection stories in the Australian media and the public’s attitude toward sun protection and tanning between 1994 and 2007, Dixon, Warne, Scully, Dobinson, and Wakefield (2014) found that media stories promoting sun protection led to a decreased preference for tanning.

Several existing studies provide insights into cause framing and solution framing of skin cancer in the mass media. Stryker, Solky, and Emmons (2005) studied the AP news coverage of skin cancer between 1979 and 2003 and found that treatment was covered in 47% of all stories, while prevention was discussed in 31.8% of stories. More recently, Cokkinides, Kirkland, Andrews, Sullivan, & Litchenfeld (2012) examined print media’s coverage of skin cancer in 2009 and concluded that prevention was the most important theme in these articles. To understand the cause and solution frames used in the discussion of skin cancer on Pinterest, we asked the next RQ.

**RQ2: How is skin cancer covered in terms of cause, treatment, and prevention?**

*Health Belief Model*
According to the health belief model (HBM), a person will make a change in health behavior if three conditions are met: 1) a negative health outcome could be avoided; 2) positive effects could be achieved by adopting a recommended action; and 3) a belief in his ability to take the recommended action successfully is present (Becker & Rosenstock, 1984). Based on these assumptions, the HBM identifies the following five constructs as determinants of health behavior change: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, cue to action, and perceived self-efficacy (Rosenstock, Strecher, & Becker, 1988).

Perceived susceptibility refers to the perception of how likely one is going to be affected by a disease or health risk (Becker, Haefner, & Maiman, 1977). People are likely to adopt behavioral changes when they consider themselves to be susceptible to the disease or risk factor. Perceived severity refers to people’s assessment of the seriousness of the disease (Janz & Becker, 1984). The more people recognize the seriousness of a disease or health risk, the more likely they will be to change their behaviors to avoid the negative consequences. Perceived benefits refer to the amount of positive results that occur from making a health behavioral change (Janz & Becker, 1984). When individuals perceive the benefits to be high, they are more likely to adopt a change in health behavior. At the same time, they will also consider perceived barriers, which refer to one’s assessment of factors that prevent the adoption of a behavioral change (Janz & Becker, 1984). These are obstacles in behavioral change or negative consequences that result from making a change. Perceived barriers are negatively correlated with behavioral change. Cue to action refers to a trigger that will jump-start a health-related behavioral change (Janz & Becker, 1984). It can be internal to a person, such as the experiencing of pain, or external to a person, such as the advice of a physician or a beloved family member. Finally, perceived self-efficacy comes from the original definition of self-efficacy, which is the
belief that one can successfully carry out a behavior or to create a certain result (Bandura, 1997). When people perceive themselves to be capable of a behavioral change, they are more likely to adopt it (Rosenstock et al., 1988). Meta-analysis of decades of research using HBM indicates that perceived benefits and perceived barriers are the strongest predictors of behavioral change (Carpenter, 2010). In the context of skin cancer prevention, health belief variables, including perceived susceptibility, perceived benefits, perceived barriers, and cues to action all significantly predicted the intention for skin protection (Kasparian, McLoone, & Meiser, 2009).

While the original HBM predicts health behavioral change based on the psychological variables discussed above, researchers have adapted this model for the study of media content by examining whether the media content includes elements that might contribute to these psychological variables. For instance, they have studied whether the media content includes a discussion about an individual’s susceptibility to a condition, the severity of a condition, benefits of a proposed behavior and the barriers associated with it, as well as cues to action (e.g., Beaudoin, 2007; Quick, 2008; Briones, Nan, Madden, & Waks, 2012). Understanding the extent to which Pinterest content on skin cancer include information about different aspects of HBM will provide insights into how these pins will inform their users about the threats of skin cancer, encourage preventative behaviors and notify them of treatments available. Hence, RQ3 asks if the Pinterest coverage of skin cancer is likely to include such elements:

RQ3: To what extent do Pinterest pins cover the susceptibility and severity of skin cancer, benefits and barriers associated with diagnosis, prevention or treatment, cues to action, and information that boosts readers’ self-efficacy?

**Most Influential Pins on Skin Cancer**

Number of repins is a measure of the influence a pin has. Han et al., (2014) found that the
characteristics of a pin instead of characteristics of the user (such as number of followers) predict the number of repins. It is of interest to examine the content of highly influential pins on skin cancer as they are likely to get more attention and could potentially bring more attitudinal and behavioral changes. Thus the next RQ is proposed:

*RQ4: What are characteristics of the contents of the top 10% most repined pins on skin cancer?*

**Types of Skin Cancer**

As previously noted, melanoma is the most deadly skin cancer yet quite rare. Non-melanoma skin cancers are more common yet less deadly. Because the nature of different types of skin cancer, it is likely that different types of skin cancer might be covered differently on Pinterest. This leads to the last RQ.

*RQ5. What are the differences of Pinterest coverage of skin cancer in general and different types of skin cancer?*

**Method**

A content analysis was conducted of pins on skin cancer.

**Sampling**

To collect pins on skin cancer, we searched Pinterest.com using four search key words: skin cancer, melanoma, squamous-cell carcinoma, and basal-cell carcinoma in October 2015. These pins were downloaded and assigned a unique identification number.

**Unit of Analysis and Measurement**

The unit of analysis was an individual pin about skin cancer. The overall demographic information of each pin was recorded, including: number of repins, number of likes, and number of comments.
Relevance. All pins downloaded were first coded for their relevance to skin cancer into three categories: high relevance, low relevance, and no relevance. A pin was coded as having high relevance when its primary focus was skin cancer and coded as of low relevance when its primary focus was something else and it only mentioned skin cancer in passing. A pin was coded as having no relevance when it did not mention skin cancer in general or any specific type of skin cancer at all. For instance, the words skin and cancer could appear in a pin, but they were used in separate sentences. The second author coded all pins downloaded (n=753) and the first author coded 10% of them (n=76) and achieved .90 percentage agreement. Non-relevant pins were excluded from further coding. In the end, a total of 708 pins relevant to skin cancer were retained.

Types of skin cancer. Each pin was coded based on the types of skin cancer covered into (1) skin cancer in general, (2) melanoma, (3) squamous-cell carcinoma, and (4) basal-cell carcinoma (Stryker et al., 2005). When a pin contained information about both skin cancer in general and information about one specific type of skin cancer (such as melanoma), it is coded as the specific type of skin cancer. When a pin mentioned more than one type of skin cancer, it was coded as the type most prominently discussed in the pin. This variable was coded to answer RQ1 about first-level agenda setting.

Goal. To assess the primary goal of each pin, we assigned the pins into one of the following three categories: (1) informative (when the goal of the pin was to inform the public without making explicit suggestions for behavioral change); (2) persuasive (when the goal of the pin was to persuade the readers to change their behaviors regarding skin cancer); and (3) advertisement (when the goal of the pin was to promote products, services, or charity events related to skin cancer).
The next three variables were coded to answer RQ2 based on second-level agenda setting.

**Cause.** Each pin was coded in terms of whether it includes one or more of the following four major causes: (1) sun exposure, (2) tanning bed, (3) others (including genetics), (4) multiple causes, and (5) none. These five categories were mutually exclusive.

**Prevention.** Both primary and secondary prevention methods were examined based on the categories develop by Stryker et al. (2005) and Cho et al. (2010). First, each pin was coded to see if it included any information on primary prevention, i.e. methods that could decrease the chance of getting skin cancer. If primary prevention was coded as present, the pin was further coded to see if it included one or more of the following four methods of primary prevention: (1) using sunblock, (2) avoiding tanning bed, (3) staying in the shade, and (4) wearing protective clothing (such as long-sleeved shirts or wide-brimmed hats). Similarly, each pin was coded for whether it discussed secondary prevention, i.e. method that enabled early detection of skin cancer. When a pin was coded as containing information on secondary prevention, it was further coded in terms of whether it included one or more of the following methods of secondary prevention: (1) see a doctor, (2) self-examination, and (3) warning signs. Categories of methods of primary and secondary prevention were not mutually exclusive and a pin could contain multiple primary and/or secondary prevention methods.

**Treatment.** Each pin was coded based on the types of treatment it mentioned: (1) mainstream biomedical treatment (e.g. surgery, chemotherapy, and radiation therapy), (2) alternative therapy (e.g. herbs and foods), (3) general mention of treatment without specifics, and (4) none. These four categories were mutually exclusive.

The next six variables were based on the HBM. Since the HBM was originally designed
to measure psychological variables, adjustments were made to create variables to measure media content that might contribute the original psychological variables of HBM based on previous studies (e.g. Beaudoin, 2007; Briones et al., 2012; Quick, 2008).

**Susceptibility.** Susceptibility (present/absent) was coded when the pin discussed the prevalence of skin cancer (e.g. skin cancer is the most common type of cancer in the United States) or how likely someone was to develop skin cancer (e.g. young women under 29 are at increased risk for skin cancer).

**Severity.** Severity was coded when the pin discussed the seriousness of skin cancer (present/absent). It could be reflected in terms of medical consequences (death), financial consequences (high cost of treating skin cancer), or other types of consequences.

**Benefits.** Benefit was coded as present or absent in terms of whether the pin discussed the benefit of a prevention method, a diagnostic method or a treatment. When a pin was coded as containing benefit, we further coded whether it included one or more types of benefits: (1) benefit of a prevention method, (2) benefit of a diagnostic method and (3) benefit of a treatment method. These three categories of benefits were not mutually exclusive.

**Barriers.** Barrier was coded as present or absent in terms of whether a pin contained information about the difficulties involved in the prevention, detection and treatment of skin cancer. When a pin was coded as containing barriers, we further coded whether the pin included these three types of barriers: (1) barriers of prevention, (2) barriers of detection/diagnosis, and (3) barriers of treatment. These three categories of barriers were not mutually exclusive.

**Cue to Action.** Cue to action was coded when a pin included explicit suggestion that the reader adopt a certain behavior (e.g. “protect yourself”, or “always wear sunscreen”).

**Self-efficacy.** A pin was coded as boosting self-efficacy when it suggested that the
prevention, diagnosis or treatment discussed would be easily achieved or offered explicit encouragement. For instance, a pin could boost readers’ self-efficacy if it contained a phrase like “The ABCs of skin cancer prevention.”

**Coding and Intercoder Reliability**

The two authors served as coders for this study. After two rounds of training during which they coded a systematically selected subsample of pins (5% for each round), the second author coded all pins in the sample (n=708), and the first author coded 10% of the pins (n=71), which were selected using systematic sampling. Percentage agreements were calculated to check for intercoder reliability: types of skin cancer (.94), goals (.93), cause (.92), treatment (.92), prevention (.94), susceptibility (.94), severity (.95), benefits (.93), barriers (.98), cue to action (.96), and self-efficacy (.90).

**Data Analysis**

Descriptive statistics were calculated (frequencies and percentages) to answer RQs 1-4. To answer RQ5, we collapsed different types of skin cancers into the following three categories: skin cancer in general, melanoma, and non-melanoma skin cancers (squamous-cell carcinoma and basal-cell carcinoma combined). A series of pairwise Chi-square tests were conducted to further test their differences. Holm’s sequential Bonferroni correction was used to adjust for multiple testing (Abdi, 2010).

**Results**

---

1 We chose to use percentage agreement instead of intercoder reliability measurements traditionally considered to be more rigorous such as Cohen’s Kappa or Krippendorff’s alpha for two reasons. First, percentage agreement is considered especially appropriate in coding categorical variables (present/absent) (Neuendorff, 2002). Second, percentage agreement is more appropriate than kappa or alpha when the distribution of the measure is highly skewed, because latter measurements tend to make the intercoder reliability artificially low even when coding is reasonably reliable (Potter & Levine-Donnerstein, 1999). The distribution of measures is skewed in this study as a large majority of the items were coded as absent in a large majority of pins.
Among the 708 pins coded, 82.1% (n=581) were considered highly relevant to skin cancer while the remaining 17.9% (n=127) were of low relevance. Overall, these pins had an average of 48.36 repins (SD=127.75), 6.86 likes (SD=17.59), and .22 comments (SD=.74). The majority of pins (n=549, 77.5%) were informative, 16.7% (n=118) were advertisement, and only 5.6% (n=40) were explicit persuasive messages for behavioral change.

RQ1 asked the extent to which different types of skin cancers were covered on Pinterest. Our data showed that skin cancer in general (n=194, 27.4%), melanoma (n=159, 22.5%), squamous-cell carcinoma (n=171, 24.2%) and basal-cell carcinoma (n=184, 26.0%) received almost equal coverage on Pinterest in terms of frequency.

RQ2 asked the cause and solution framing of skin cancer in terms of cause, treatment and prevention. Only 16% (n=113) of the pins included specific information about causes for skin cancer. Among them, 44% (n=51) mentioned sun exposure, 30.2% (n=35) included tanning beds, 9.5% (n=11) discussed other causes and 14.2% (n=16) identified multiple causes. Treatment of skin cancer was mentioned in 30.2% of the pins (n=214). Among them, alternative treatments (n=130, 60.7%) were much more prevalently mentioned than traditional biomedical treatments (n= 56, 26.2%) and general mention of treatments (n=28, 13.1%). In terms of prevention, only a small percentage of pins included any suggestions or guidelines for either primary prevention (n=46, 6.5%) or secondary prevention (n=104, 14.7%). Among methods of primary prevention, using sunscreen was discussed most frequently (n=41, 89.1%), followed by seeking shade (n=19, 41.3%), protective clothing (n=18, 39.1%), and avoiding tanning bed (n=16, 34.8%). Among methods of secondary prevention, warnings signs were mentioned most frequently (n=83, 79.8%), followed by self-exam (n=31, 29.8%) and examination by a dermatologist (n=28, 26.9%). A pin could include more than one primary and/or secondary
prevention methods.

RQ3 explored the extent to which Pinterest pins on skin cancer addressed the susceptibility and severity of skin cancer, benefits and barriers associated with diagnosis, prevention and treatment, cue to action, and readers’ self-efficacy. In terms of variables affecting perceived threat of skin cancer, only 14.1% (n=100) of the pins discussed how susceptible people were to skin cancer and 12.3% (n=87) of the pins covered how serious skin cancer could be. Overall, 177 (25%) pins discussed benefits. Among them, 19.6% (n=40) covered the benefit of a prevention method, 18.6% (n=38) mentioned the benefit of diagnostic methods, and 51.5% (n=105) mentioned the benefit of a treatment. In addition, only 8.6% (n=61) mentioned barriers associated with a suggested behavior. Among them, barriers of diagnosis were mentioned most often (n=28, 45.2%), followed by barriers of treatment (n=24, 38.7%), and barriers of prevention (n=12, 19.4%). Note that in terms of benefits and barriers, a pin could include more than one type of benefits and/or barriers listed above. Approximately one fifth of the pins (n=135, 19.1%) included cue to action (i.e. information that urges readers to act). Finally, only 12.3% (n=87) of pins included textual information that might lead the readers to believe that they could perform the recommended behaviors easily.

To answer RQ4, we further analyzed the top 10% of pins in terms of number of repins (n=71). These pins were almost exclusive about skin cancer in general (n=39, 54.9%) or melanoma (n=30, 42.3%), with only two pins on non-melanoma skin cancer (2.8%). In terms of cause framing, around one third of these pins (n=23, 32.4%) mentioned the cause of skin cancer. Among them, 39.1% (n=9) discussed sun exposure only, 39.1% (n=9) discussed tanning only, and 21.7% (n=5) included multiple causes. In terms of solution framing, 31% of these pins (n=22) discussed treatment of skin cancer. Among them, alternative treatment was mentioned
(n=13, 59.1%) more than traditional biomedical treatment (n=8, 36.4%). One pin (4.5%) mentioned treatment vague without identifying either biomedical or alternative treatment. Only 15.5% of the pins (n=11) discussed primary prevention method. Sunscreen usage (n=11) was most frequently mentioned, followed by avoiding tanning bed (n=7), seeking shade (n=7), or protective clothing (n=7). Of these top 10% pins, 22 (31%) discussed secondary prevention method. Warning signs (n=18) were mentioned most often, followed by exam by doctors (n=10) and self exam (n=6).

In terms of HBM related variable, among these 10% most popular pins, 28.2% (n=20) discussed individuals’ susceptibility to skin cancer and 19.7% (n=14) discussed the severity of skin cancer. Benefits were discussed in 35.3% of pins (n=25). Benefits of treatment (n=10) was most often mentioned, followed by benefits of a prevention method (n=8) and benefits of a diagnostic method (n=8). Ten pins (14.1%) discussed barriers. More specifically, 3 pins mentioned the barriers of prevention, 5 pins mentioned the barriers of diagnosis, and 4 pins mentioned the barriers of treatment. Cue to action was present in 46.5% (n=33) of pins and messages boosting self-efficacy was identified in 25.4% (n=18) of pins.

RQ5 explored how different types of skin cancer were covered similarly or differently on Pinterest. See Table 1 for a descriptive comparison of pins on skin cancer in general, on melanoma, and on non-melanoma skin cancer. See Table 2 for results of pairwise comparisons: skin cancer in general vs. melanoma, skin cancer in general vs. non-melanoma, and melanoma vs. non-melanoma.
Overall, pairwise comparisons showed that the pins on skin cancer in general and the pins on melanoma were very similar, with only three items that demonstrated statistical significance: benefits of treatment, warning signs and alternative treatment. Pins on skin cancer in general were more likely to discuss the benefits of treatment and alternative treatment than pins on melanoma but were less likely to discuss warning signs.

Pins on non-melanoma skin cancer were found to be generally information poor. They were less likely to have a persuasive goal than pins on skin cancer in general or pins on melanoma. Furthermore, pins on non-melanoma skin cancer were less likely to discuss causes of skin cancer than other types of pins. More specifically, they were less likely to discuss tanning bed as a cause of skin cancer than pins on melanoma and were less likely to attribute skin cancer to sun exposure than pins on skin cancer in general.

As for prevention, pins on non-melanoma skin cancer were significantly less likely to discuss either primary or secondary prevention methods than other types of pins. More specifically, they were less likely to identify using sunscreen, avoiding tanning bed, seeking shade, and wearing protective clothing than pins on skin cancer in general or pins on melanoma. Similar patterns were found in the discussion of secondary prevention measures. Pins on non-melanoma skin cancer were less likely to suggest examination by a dermatologist or to recommend self-examination than pins on skin cancer in general or pins on melanoma. Finally, pins on non-melanoma skin cancer were less likely to discuss warning signs than pins on melanoma. As for treatment, pins non-melanoma skin cancer were significantly less likely to discuss alternative treatment than pins on skin cancer in general.

In terms of variables associated with the HBM, pins on non-melanoma skin cancer were less likely to include discussion of susceptibility and severity than pins on skin cancer in general.
or pins on melanoma. In terms of benefits, pins on non-melanoma skin cancer were less likely to discuss the benefits of diagnosis than pins on skin cancer in general or pins on melanoma. They were also less likely to discuss the benefits of a treatment than pins on skin cancer in general. Furthermore, pins on non-melanoma skin cancer were less likely to include cues to action and message boosting self-efficacy than pins on skin cancer in general or pins on melanoma. However, there was no statistically significant difference among the three types of pins in terms of their likelihood of discussing the benefits of prevention, and barriers associated with prevention, diagnosis, and treatment.

**Discussion**

Young people, especially young women in the United States, are subject to heightened risk of skin cancer (National Cancer Institute, 2014b). Traditional mass media have been found to be ineffective in creating correct health beliefs about skin cancer among young adults (Hay et al., 2009). As a social media site especially popular among young women, Pinterest has the potential to inform its users about the risk factors associated with skin cancer and promote skin cancer prevention. This study analyzed pins on Pinterest about skin cancer through a quantitative content analysis.

In terms of agenda setting -- melanoma, squamous-cell carcinoma, and basal-cell carcinoma -- received almost equal amount of coverage on Pinterest as measured by the number of pins. This is different from the findings of earlier studies on skin cancer coverage in national newspapers that non-melanoma skin cancers were under reported (e.g. Heneghan et al., 2007). According to the agenda setting theory, the media agenda will influence the public agenda. The increased coverage of non-melanoma skin cancers will raise public awareness of these less known conditions, at least among Pinterest users.
The framing of skin cancer on Pinterest has been found to be problematic. Only 16% of the pins discussed the causes of skin cancer. Lack of cause framing is problematic since portraying skin cancer without discussing its causes might create a sense of powerlessness among the audience. In terms of solution framing, treatments of skin cancer are discussed more than causes or preventions. This is consistent with the findings of studies that examine wired news articles on skin cancer (Stryker et al., 2005). Only 6% of the pins included explicit information on primary skin cancer prevention methods. Even among pins that do discuss the primary methods for skin cancer prevention, the information contained is far from complete.

While almost all of them discuss the use of sunscreens, less than half of them identify avoiding tanning bed, seeking shades, or wearing protective clothing. This is consistent with the findings of Cho et al. (2010)’s study of the coverage of tanning in eight women’s magazines in the United States. Using sunscreen alone is not always effective in preventing skin cancer (Cancer Research UK, n.d.). Furthermore, advocating the use of sunscreen without mentioning other methods of prevention could be counterproductive because people who believe in the effectiveness of sunscreen in skin cancer prevention are less likely to use other forms of sun protection and more likely to spend more time in sun and get sunburns (Vainio & Bianchini, 2001). Around 15% of the pins include information on secondary skin cancer prevention methods. Among them, around 80% introduced warning signs of skin cancer, but less than 30% would encourage readers to perform a self-exam or to get examined by a dermatologist. Hence, educating readers about skin cancer prevention on Pinterest could promote healthy behaviors and reduce the morbidity rate of skin cancer, at least among the population who are heavy users of Pinterest: young women. Health promotion through Pinterest in the future should include more information about both primary and secondary prevention methods. Even though treatments were discussed in almost
30% of the pins, alternative treatments were twice more likely to be mentioned than biomedical treatments. Encouraging patients to use alternative therapy alone, such as using food or certain herbs to treat skin cancer, could be potentially dangerous as it might delay these patients from seeking biomedical treatment like surgery or chemotherapy.

In terms of the health beliefs about skin cancer, Pinterest portrays skin cancer as low threat, with less than 15% of the pins discussing susceptibility and around 12% discussing the severity of skin cancer. According to the prediction health belief model, when readers believe the risk of skin cancer is small, they are less likely to adopt behavioral changes. With regard to the benefits and barriers associated with prevention or treatment methods, Pinterest tends to describe these as beneficial and easy to adopt, with nearly 29% of the pins mentioning the benefits of a prevention or treatment method and with only 4.5% discussing the barriers associated with it. This finding is encouraging because past research has shown that emphasizing the benefits and downplaying the barriers of a proposed behavior is conducive to behavioral change related to skin cancer (Kasparian et al., 2009). However, only 19% of the pins include a cue to action, i.e. an explicit instruction urging people to adopt a behavior, and only 12.3% of the pins contain information that increases readers’ self-efficacy. This finding is not surprising since the majority of the pins on skin cancer are informative instead of persuasive. According to HBM, to encourage people to adopt the prevention or treatment proposed, media should heighten the level of threat portrayed, increase cues to action, as well as incorporate more information to increase people’s perceived self-efficacy with regard to skin cancer prevention and treatment.

The most influential 10% of the pins represent a distinctive group. They are almost exclusively about skin cancer in general and melanoma. Overall, these most popular pins are information rich. A higher percentage of these pins discuss the causes, treatments, and secondary
prevention. In addition, a higher percentage of these pins include all HBM variables including: susceptibility, severity, benefits, barriers, cue to action, and self-efficacy. It is possible that information rich pins are more likely to be repined.

However, the contents of the pins on skin cancer in general, melanoma, and non-melanoma skin cancer are quite different. Overall, pins on skin cancer in general and on melanoma contain more information about the causes of skin cancer and methods of prevention. Such information is essential in educating the public about the risk factors associated with skin cancer and ways of protecting themselves. In addition, pins about skin cancer in general and about melanoma are not only more likely to encourage certain prevention or treatment but are also more likely to include health belief variables associated with increased likelihood of adoption of said prevention or treatment. On the other hand, pins on non-melanoma skin cancer tend to contain less scientifically accurate information about skin cancer and more biased information. A higher percentage of these pins are advertisements, compared to pins about skin cancer in general and about melanoma.

One possible reason for the low quality of information found in pins about non-melanoma skin cancer is that infographics about skin cancer tend to be about skin cancer in general or melanoma, which is the most aggressive and deadliest type of skin cancer, and that usually such infographics are information rich and discuss the causes, symptoms, prevention, and treatment for skin cancer. In addition, because of its integration of visuals and text, infographics have been found to provoke issue-relevant thinking among audiences in the communication of scientific topics (Lazard & Atkinson, 2015). This means that in raising the public’s awareness about skin cancer, public health professionals could utilize infographics to disseminate information about non-melanoma skin cancer.
Limitations

Pinterest allows the dissemination of health information visually. The current study only focused on the textual information about skin cancer on Pinterest. Future research should examine the characteristics of visual images in terms of the color, size, and layout, as well as characteristics of the pictures used in those pins about skin cancer. Next, one of the most important features of Pinterest is that it allows readers to create their virtual pin board. It is of great importance to study the characteristics of a pin about skin cancer or another health topic in terms of its textual content and its visual characteristics that make it more or less likely to be repined.

Conclusions

While skin cancer was traditionally considered an ailment of older people, today young people, especially young women, are under heightened risk (National Cancer Institute, 2014b). Social media hold special potential in raising awareness about skin cancer among this population. Presented here is the first systematic study of the coverage of skin cancer on Pinterest, a social media site most used by young women (Pew Research Center, 2015). Theoretically, this paper provides a comprehensive framework to examine illness-specific information on Pinterest based on the agenda setting theory and HBM. Practically, the findings of this study can serve as the baseline for the design of intervention strategies. For instance, more discussion about the causes of the skin cancer, such as sunburn and the use of tanning bed will awareness among Pinterest users. Presentation of a comprehensive set of prevention methods (such as the combination of using sunscreens, avoiding tanning bed, staying in the shade and wearing protective clothing) instead of discussing the use of sunscreen alone will better educate Pinterest users in protecting themselves. Traditional biomedical treatment should be given more
prominence as well.
References


Communications and Mobile Computing Conference (pp. 322-327). IEEE.


Kastrenakes, J. (September 17, 2015). *Pinterest now has 100 million monthly users*. Retrieved from http://www.theverge.com/2015/9/17/9348519/pinterest-100m-monthly-users


*JAMA Dermatology, 151*, 1081–1086.


