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Impact of Self-Efficacy and Time on Skin Cancer Protective Behaviors

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Abstract

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JD, University of Miami, 1985

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Skin cancer incidence is increasing while the rates of other cancers is declining. The purpose of this quantitative study was to determine whether health self-efficacy predicted skin cancer protective behaviors. The theory of health self-efficacy provided the framework for the study. Secondary data were collected from the 2008 and 2014 Health Information National Trends Surveys. The study sample included women 18-34 years of age because this population is especially vulnerable to skin cancer. Results of logistic regression analyses indicated that higher levels of health self-efficacy predicted greater sunscreen use, but higher health self-efficacy levels did not predict avoidance of tanning bed or booth use. No significant changes were found in sunscreen use and tanning bed and booth use between 2008 and 2014. Findings may be used to develop educational programs and medical interventions to decrease the incidence of skin cancer.

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Dedication

I am dedicating this dissertation to my husband, David G. Goldbas. He has been amazingly supportive and patient throughout this endeavor. His is my hero in so many ways.

Acknowledgments

First, I thank God.

I would like to thank my dissertation committee members for their guidance. Both have pushed me to write a dissertation that has turned out to be worthwhile. I believe my committee chairperson, Dr. Nina A. Nabors, is a truly remarkable educator with an intelligent grasp of the demands of being a chairperson and mentor. She has been so very patient. The second committee member, my methodologist, Dr. Amy E. Sickel, has likewise guided me with much patience and support. She has encouraged me to strive for expertise, and I will forever be mindful of this lesson as I continue to research and write on health psychology issues.

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Chapter 1: Introduction to the Study

Skin cancer, the most common form of cancer, is on the rise (Centers for Disease Control and Prevention, 2016a; National Cancer Institute, 2016a). In the United States, four million cases of basal cell carcinoma (BCC) and more than one million cases of squamous cell carcinoma (SCC) are diagnosed each year (Skin Cancer Foundation, 2017). Melanoma is less common than the nonmelanoma forms but is the most deadly (Centers for Disease Control and Prevention, 2016a). The incidence rates for melanoma have doubled over the last 30 years (Centers for Disease Control and Prevention, 2016a). The American Cancer Society (2016c) estimated that in the United States during 2017, over 87,000 people will be diagnosed with melanoma and 9,730 people will die. For young adult women, skin cancer is one of the most common cancers diagnosed (American Cancer Society, 2016c; Diao & Lee, 2014; Weir et al., 2011). The American Cancer Society (2017) estimated that in the United States in 2017, there will be over 34,940 new melanoma diagnoses in women, and approximately 3,350 women will die. Most skin cancers are preventable because most cases result from excessive ultraviolet (UV) radiation exposure from the sun and indoor tanning devices (Diao & Lee, 2014; Noar, Myrick, Morales-Pico, & Thomas, 2014).

Previous studies indicated that women often do not protect themselves from excessive exposure to UV radiation, which could be accomplished by using sunscreens and avoiding indoor tanning devices (Bagatti, Englert & Cline, 2016; Ch'ng & Glendon, 2013; Diao & Lee, 2014). Underlying factors may encourage women to risk skin cancer

(He, 2014; Mahler, 2015). Studies have indicated that some women risk skin cancer because of a desire to improve their appearance with a tan (Mahler, 2015).

The first two research questions in this study were designed to address the results of the 2014 Health Information National Trends Survey (HINTS) 4, Cycle 4, which included survey data of a national representation of women, ages 18 to 34, to determine whether their beliefs of health self-efficacy, that is their confidence levels with regard to taking care of themselves, predicted their skin care with regard to skin cancer. The first two research questions address the predictive relationship between the independent variable of health self-efficacy and the two dependent variables of skin cancer protective behaviors, use of sunscreen and avoidance of tanning beds and booths.

Health self-efficacy has been studied to determine its effect on people's attitudes and behaviors in many medical circumstances, including those that involve skin cancer (Pertl et al., 2010). Health self-efficacy is a form of self-efficacy that relates to health issues. Self-efficacy is derived from social cognitive theory, a learning theory conceived by Bandura (1977). Self-efficacy describes people's beliefs that they can be successful in their endeavors and achieve their goals (Bandura, 1977). Health self-efficacy is a form of self-efficacy that relates to health issues. In this study, limited health self-efficacy may predict limited skin cancer protective behaviors. Findings from this study may be used to develop health interventions designed to boost women's health self-efficacy levels, which may lead to better skin care protective behaviors and a decrease in skin cancer.

The third research question addressed possible trends between women surveyed in the 2008 HINTS 3 and women in the 2014 HINTS 4, Cycle 4 with regard to their skin

cancer preventive behaviors. The sample means of skin cancer preventive behaviors per group were compared. Significance of the results related to the fact that the number of skin cancer diagnoses has increased (Centers for Disease Control and Prevention, 2016a). If findings indicated that sunscreen use was significantly greater in 2014 than 2008, it may be necessary to look for other causes of the increased incidence of skin cancer. It is possible that sunscreens may not be as effective as they are claimed to be (Pratt et al., 2017; Tan, MatJafri, Omar, & Maryam, 2018). This chapter includes the statement of the problem, the purpose of the study, the theoretical framework, the nature of the study, and the significance of the study.

Problem Statement

Although skin cancer diagnoses for women have been increasing at an alarming rate, there has been no conclusive research on the factors that influence skin cancer protective behaviors in women (Centers for Disease Control and Prevention, 2016b). Although skin cancer can often be avoided by practicing preventive behaviors, such as using sunscreen, women are not consistent in their skin cancer preventive behaviors (American Cancer Society, 2016e). Many studies have indicated that various factors influence people's attitudes and behaviors with regard to skin cancer prevention, and that these attitudes and behaviors are not necessarily rational relative to the health risks involved (Bagatti et al., 2016; Rosenstock, 1974). These factors include people's desire to look attractive (tanned) and beliefs that skin cancer appears to be unavoidable (Dar-Nimrod, Cheung, Ruby, & Heine, 2014; Guy, Berkowitz, Watson, Holman, & Richardson, 2013; He, 2014). Knowledge of skin cancer and prevention does not

necessarily lead to health behaviors (Diao & Lee, 2013). More research regarding underlying motivations and skin care has been promoted.

Empirical research on the underlying motivations that influence women's use of skin cancer preventive behaviors has been inconclusive. Few studies have been conducted on the effect of self-efficacy on people's attitudes and behaviors concerning skin cancer, despite the fact that self-efficacy has been found to be predictive of people's self-care (Pertl et al., 2010). Self-efficacy refers to a person's feelings of being able to achieve a stated goal, and self-efficacy has long been acknowledged as a significant influence on various behaviors (Bandura, 1977). Pertl et al. (2010) and He (2014) found that underlying feelings of self-efficacy are related to women's skin cancer preventive behaviors. These studies were limited, however. Pertl (2010) used a small sample of homogeneous respondent. He's (2014) study was published as an abstract only and empirically ill-defined. The first two research questions in this study expanded on these studies to fill a gap in the literature by assessing whether health self-efficacy predicts women's skin cancer protective behaviors using data from a large-scale national survey of women.

The third research question addressed the problem of high numbers of skin cancer diagnoses among U.S. women and the notion that many women risk skin cancer by not using skin cancer preventive behaviors. I examined the possible trends regarding women's skin cancer protective behaviors (use of sunscreen and tanning behavior) over a 6-year period from 2008 to 2014. Young adult women's responses in the 2008 HINTS and the 2014 HINTS data were compared. This question differed from the first two

research questions in that it did not address motivational factors. No studies were found to have used HINTS survey data regarding women spanning 2008 to 2014 (Basch, Basch, Janan, & Ruggles, 2014).

Purpose of the Study

The purpose of the first two research questions was to determine whether the underlying motivation of health self-efficacy predicted women's skin cancer protective behaviors as measured by the use of sunscreen and use of tanning beds and booths (see Mahler, 2015). Women, ages 18-34, were chosen for examination because they are at high risk for melanoma and are more likely to contract melanoma than their male counterparts (Weir et al., 2011). Further, women are more likely to use indoor tanning devices, which are known to cause cancer (National Cancer Institute, 2016b). The source of the archival data was the 2014 HINTS survey. The identification of health self-efficacy as a predictor of women's skin cancer preventive behaviors may assist the medical community in designing educational programs to prevent skin cancer.

The purpose of the third research question was to compare the 2008 HINTS and 2014 HINTS data to analyze trends, if any, regarding women's skin cancer protective behaviors of the use of sunscreen and the avoidance of indoor tanning devices (see Bagatti et al., 2016). This question addressed the possibility of less use of sunscreen by women in 2014 as compared to 2008 despite promotional efforts by manufacturers to buy it and educational programs that support its use (Basch et al., 2014). Findings may also be used to understand why skin cancer for this cohort has steadily increased in recent years (Centers for Disease Control and Prevention, 2016a). Although a causal relationship

could not be determined, findings may be used to motivate women to use more sunscreen and act in healthier ways to avoid skin cancer.

Research Questions and Hypotheses

The three research questions (RQs) and hypotheses were used to guide the study:

RQ1: Does health self-efficacy predict the use of sunscreen?

H_o1: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2, and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

H_a1: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2, and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

RQ2: Does health self-efficacy predict tanning behavior?

H_o2: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2, and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

H_a2: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2, and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

RQ3: Is there a difference between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey regarding skin

cancer protective behaviors including the use of sunscreen and tanning behavior as measured by survey responses regarding their use of sunscreen and tanning behavior?

H_o3: There is no statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey, as measured by the 2008 HINTS 3 survey questions G1 and G2 and the 2014 HINTS, Cycle 4 survey questions H7 and H6.

H_a3: There is a statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey, as measured by the 2008 HINTS 3 survey questions G1 and G2 and the 2014 HINTS 4, Cycle 4 survey questions H7 and H6.

Theoretical Framework

The theoretical framework for the first two research questions was health self-efficacy theory. This theory attempts to explain people's behaviors and attitudes regarding their health. Although this theory is derived from the work regarding people's attitudes and behaviors about their health conducted by Rosenstock (1974) in the early 1950s (Glanz, Rimer, & Lewis, 2008), the concept stems from Bandura's (Bandura,1977; Bandura & National Institute of Mental Health 1986) research regarding his comprehensive social cognitive theory (formerly known as social learning theory). Social cognitive theory (SCT) postulates that people learn from others' modeling and will imitate others, depending on the consequences observed (rewards or punishments). The

theory of self-efficacy, a person's beliefs regarding his or her ability to achieve a goal, dovetails with SCT because people's assessment of their ability to achieve a goal is influenced by the perceived success others have had in achieving similar goals (Bandura, 1977; Bandura & National Institute of Mental Health, 1986). Further, health self-efficacy is a form of self-efficacy and relates to people's feelings about their ability to achieve their personal health goals (Chen & Lin, 2010). With the first two research questions, I wanted to examine the relationship between women's feelings of health self-efficacy and what women do to protect themselves from skin cancer (i.e., the degree to which they use sunscreen and avoid the use of tanning beds and booths).

Nature of the Study

I conducted a quantitative study using archival data from the 2008 HINTS and 2014 HINTS surveys that each had several thousand women respondents. To answer the first two research questions of the study, I used logistic regression statistical analyses with the SAS program to determine whether a relationship existed between the independent variable of health self-efficacy, as measured by the women's responses to the question, "Overall, how confident are you about your ability to take care of your health?" and the dependent variables of skin cancer protective behaviors as measured by the women's responses to the questions, "When you are outside for more than one hour on a warm, sunny day, how often do you wear sunscreen?" and "How many times in the past 12 months have you used a tanning bed or booth?" The response options were designed using Likert scales (Chen & Feeley, 2014; Rutten et al., 2012; Taber et al., 2015). For the third research question, I conducted multivariate analyses of variance

(MANOVAs) to compare the means of the responses by the female participants in the 2008 HINTS and 2014 HINTS to ascertain trends, if any, over the 6 years regarding skin cancer protective behaviors. The 2008 HINTS questions were, "When you go outside during the summer on a warm sunny day, how often do you do each of the following…wear sunscreen?" and "How many times in the past 12 months have you…used a tanning bed or booth?" The 2014 HINTS questions were, "When you are outside for more than one hour on a warm , sunny day, how often do you wear sunscreen?" and "How many times in the past 12 months have you used a tanning bed or booth?" I examined skin cancer protective behavior defined as avoiding excessive ultraviolet radiation exposure. Two protective/avoidance behaviors were examined: sunscreen use and the use of indoor tanning devices. The HINTS questions quantify tanning device use; however, the HINTS data were extrapolated to define avoidance (i.e., a certain number of women do not use tanning beds and booths and thus practice protective behavior by avoiding excessive UV radiation).

Definitions

Health self-efficacy: Health self-efficacy is self-efficacy that pertains to a person's attitudes and behaviors about his or her health. A person who has a high degree of health efficacy is more likely to set an ambitious health goal and is more likely to achieve that goal. For example, a person with a strong sense of health self-efficacy who has a relatively ambitious goal of stopping cigarette smoking without outside support and in a relatively short period of time is more likely to do so. Further, a person who has a

high sense of health self-efficacy will act in healthy ways and follow through with prescribed medical treatments (Pertl et al., 2010).

Indoor tanning devices (beds and booths): These are machines that emit UV light and are used to induce tan or darkened skin. The device can be either a tanning booth, in which one stands up, or a tanning bed, in which one lies prone. The use of either device is timed in minutes per session according to the customer's needs. Tanning beds or booths are known to cause skin cancer, and health organizations such as the World Health Organization warn against their use because they are deemed to produce excessive UV radiation (Diao & Lee, 2014; Mays, Murphy, Bubly, Atkins, & Tercyak, 2016). Avoidance, not use, of tanning beds and booths is a skin cancer protective behavior.

Self-efficacy: Self-efficacy is a psychological construct that refers to people's perceptions of their ability to achieve goals and be successful in their endeavors (Bandura, 1977). The greater the sense of self-efficacy a person has, the more likely that person will be to have high-ranking goals and be successful in achieving them.

Sunscreens: Sunscreens are marketed as topical lotions, gels, and sprays that are placed on exposed skin to protect from UV damage. Sunscreens come in varying levels of protection and range in price. They are not 100% effective; however, they are promoted as a significant aid in preventing skin damage leading to skin cancer (Cancer Research, UK, 2016a; Tan et al., 2018).

Ultraviolet (UV) radiation: Light, usually thought of as from the sun and indoor tanning devices, which can cause changes in skin cell DNA (Berneburg et al., 2004). UV radiation is broken down into two main types, UVA and UVB rays (American Academy

of Dermatology, 2016). UVA radiation is carcinogenic. UVB radiation causes sunburns. Excessive UV radiation exposure is well known to cause skin cancer (Diao & Lee, 2014).

Assumptions and Limitations

I used archival data from the 2008 HINTS and 2014 HINTS surveys for this study. HINTS are biennial, cross-sectional surveys of a nationally representative sample of U.S. adults regarding cancer knowledge and behaviors. Several assumptions were made regarding how these surveys were conducted as well as their results. I assumed that each of the biennial surveys conformed to rules regarding standardization of interview procedures and general rules of data compilation and analyses, and that they had validity. Further, I assumed that the sample represented the population and that the survey measured what it was designed to measure (see Cantor, Covell, Davis, Park, & Rizzo, 2005; Faul, Erdfelder, Buchner, & Lang, 2009). I also assumed that the respondents answered the interview questions honestly. Results may have been influenced by social desirability bias due to the fact that respondents may have wanted to appear more knowledgeable about skin cancer than they actually were, or pretended to not risk excessive UV exposure in an effort to appear more acceptable to the interviewer (see Leite & Cooper, 2010).

The major limitation regarding this study was generalization. Results can only be applied to women ages 18-34 in the United States during the years 2008 and 2014. The results do not represent any other population. Another limitation was the fact that I was constrained with regard to the wording of the questions used in the HINTS surveys. For example, the single survey question that operationalizes health self-efficacy is very

general: “Overall, how confident are you about your ability to take good care of your health?” (Chen & Feeley, 2014; Taber et al., 2015). Although a question regarding skin cancer and health self-efficacy was lacking, I assumed that access to thousands of young adult women as respondents mitigated this limitation.

Delimitations

The results of the 2008 HINTS and 2014 HINTS surveys were used in this study. Since 2003, the National Cancer Institute has conducted eight major HINTS surveys of hundreds of thousands of randomly chosen U.S. adults to determine their attitudes and behaviors regarding cancer and to explore how they obtain their knowledge of cancer and treatments (Cantor et al., 2005). The respondents can choose to have the interview conducted in English or Spanish, they can complete it over the telephone or in writing and mail it in, or they can use the Internet to respond. The question regarding health self-efficacy and the questions regarding skin cancer protective behaviors of the use of sunscreen and the use of indoor tanning devices conformed to the theoretical framework of this study. The number of female respondents ages 18 to 34 who were included in this study for the 2008 HINTS and 2014 HINTS surveys were 731 and 323, respectively.

Significance of the Study

Several studies have addressed young adult women’s viewpoints regarding skin cancer and their self-care behaviors and attitudes about avoiding skin cancer (Bagatti et al., 2016; Heckman et al., 2012; Noar et al., 2014; Pertl et al., 2010). However, these studies were limited by their small sample sizes and homogeneous populations. In the current study, the first two research questions filled a gap in the literature because they

focused on whether the underlying factor of health self-efficacy predicts the skin cancer preventive behaviors of women ages 18 to 34. The third research question addressed trends over a 6-year period in skin cancer protective behaviors as measured by the responses of thousands of U.S. women. The findings from this study may enable the medical community to better educate people about skin cancer risks as well as skin cancer protective behaviors. Efficacious skin cancer prevention interventions may save lives and reduce the financial burden for treatment of individuals.

Social Change

Walden University (2013) defined positive social change as "a deliberate process of creating and applying ideas, strategies, and actions to promote the worth, dignity, and development of individuals, communities, organizations, institutions, cultures, and societies. Positive social change results in the improvement of human social conditions". The crrent study was designed with this definition in mind. The results may expand knowledge of women's beliefs and behaviors regarding skin cancer and protective behaviors and may lead to the creation of educational programs about skin cancer and prevention (see Bagatti et al., 2016).

Summary

Skin cancer is a serious disease that is increasing among young adult women (Diao & Lee, 2014; National Cancer Institute, 2016). Skin cancer is unique among cancers in that approximately 90% of all cases are preventable because most skin cancers are caused by excessive UV radiation exposure that can be avoided (Diao & Lee, 2014; Tripp, Watson, Balk, Swetter, & Gershenwald, 2016). Women do not always act in ways

to avoid skin cancer perhaps because they believe they are more attractive and healthy-looking if they are tan; they expose themselves to excessive UV radiation by getting sunburned and using indoor tanning devices (Basch et al., 2014; Guy et al., 2013; National Cancer Institute, 2015). The first two research questions addressed whether beliefs of health self-efficacy affect women's skin cancer protective behaviors, specifically the use of sunscreen and the use of tanning beds and booths. The third research question addressed trends that may have occurred regarding women's use of skin protective behaviors according to the 2008 HINTS and the 2014 HINTS research. The results from the current study may assist in the development of educational programs that will be effective in helping women understand skin cancer risks and encourage them to treat their skin with care and avoid excessive UV radiation whether they are outdoors or in tanning salons.

Chapter 2 provides a review of the literature regarding the theory of health self-efficacy generally and as it pertains to skin cancer. I also review studies of people's perceptions of disease and personal care, and people's feelings and actions regarding skin cancer.

Chapter 2: Literature Review

Skin cancer (melanoma and nonmelanoma) is the most common cancer; there are more skin cancer diagnoses than all other cancers combined (American Cancer Society, 2016; Skin Cancer Foundation, 2017). Over five million cases of skin cancer are diagnosed each year (American Cancer Society, 2016; Skin Cancer Foundation, 2017). Skin cancer is also one of the most common cancers in young adults, especially women (American Cancer Society, 2016a; Bagatti et al., 2016; Diao & Lee, 2014; Weir et al., 2013). Melanoma, which is the most deadly form of skin cancer, is the second most common cancer in women ages 15-19 years (North American Association of Central Cancer Registries, 2016). Skin cancer has been on the rise for the last few decades, even as other cancers have been on the decline (National Cancer Institute, 2016). The rates of melanoma have doubled over the last 30 years; for women under 44 years of age, melanoma diagnoses have increased 6.1% annually (Little & Eide, 2012). In 2017, there will be over 87,000 new diagnoses of melanoma in the United States (up 11,000 from 2016), and 9,730 people will die (American Cancer Society, 2016a, 2017; Centers for Disease Control and Prevention, 2016a). The deleterious effects do not just affect individuals. The U.S. Department of Health and Human Services (2014) estimated a national, yearly economic burden for medical treatments at approximately $8.1 billion. The indirect costs, including lost productivity as a result of the disease, are estimated at over $40 million per year (Tripp et al., 2016).

Most skin cancer cases result from excessive UV radiation from sun exposure and the use of indoor tanning devices (Diao & Lee, 2014). Heredity is less frequently a main

(Diao & Lee, 2014; Noar et al., 2014; Olsen, Carroll, & Whiteman, 2010; Waters & Adamson, 2016). Most skin cancers are caused by risky UV exposure behaviors and, to a lesser degree, genetic conditions such as immune system dysfunction (Waters, Muff, & Hamilton, 2014).

The major cause of skin cancer, excessive UV exposure, is well understood and makes the disease preventable (Schulman & Fisher, 2009). Studies indicated that women risk skin cancer by not taking precautionary measures such as applying sunscreen and avoiding tanning beds and booths, which are known to be carcinogenic (Bagatti et al., 2016; Ch'ng & Glendon, 2013; Diao & Lee, 2014; Noar et al., 2014). Underlying motivations may embolden women to risk skin cancer (He, 2014; Mahler, 2015; Noar et al., 2014).

In the current study, the first two research questions addressed the underlying motivation of health self-efficacy as it predicts women's skin cancer protective behaviors, specifically the use of sunscreen and the avoidance of indoor tanning devices. Archival data from the 2014 HINTS national survey were used to answer these questions. The third research question addressed possible trends in skin cancer protective behaviors among women ages 18 to 34, as reflected the 2008 HINTS and the 2014 HINTS survey results (Volkov, Dobbinson, Wakefield, & Slevin, 2013).

Women ages 18-34 were chosen as the focus of this study because they are at a high risk for skin cancer and are more likely to contract melanoma than their male counterparts (Weir et al., 2011). Melanoma, a particularly deadly form of skin cancer, is the second most common cancer in women ages 15-19 years (North American

Association of Central Cancer Registries, 2016). In 2017, approximately 34,940 women will be diagnosed with skin cancer, and 3,350 women will die (American Cancer Society, 2017). These outcomes may the result from women's perception that a suntan is attractive (Guy et al., 2013; National Cancer Institute, 2015; Noar et al., 2014). According to the U.S. House of Representatives Committee on Energy and Commerce Minority Staff (2012), young women are particularly vulnerable to the indoor tanning device industry's advertising and marketing promotions for special occasions such as homecoming and prom celebrations.

Studies have addressed various diseases and theories of underlying motivations regarding the phenomenon that people often resist healthy behaviors and medical treatments despite knowing better (Rosenstock, 1974). Some studies have addressed the factors that influence people to shun healthy behaviors with regard to skin cancer (Dar-Nimrod et al., 2014; Diao & Lee, 2014; Noar et al., 2014). Many studies have addressed similar variables to understand people's approach to healthy behaviors concerning skin cancer. These studies reflect the complex dynamic between motivating factors and healthy behaviors regarding skin cancer risks. The purpose of these studies and the current study is the same: to acquire information that will lead to education programs to reduce the incidence of skin cancer.

The first two research questions were designed to expand prior research through examination of archival 2014 HINTS data from women ages 18 to 34. No comprehensive studies had been done addressing U.S. women and the influence of health self-efficacy on skin protective behaviors. Findings may be used to explain women's skin cancer risk

behaviors (see He, 2014; Mahler, 2015) and the underlying influences on resistance to self-care.

The purpose of the third research question was to compare the 2008 HINTS and 2014 HINTS data to identify possible differences between women's risk behaviors and healthy behaviors relative to skin cancer (Bagatti et al., 2016; Volkov et al., 2013). Although this data analysis did not address why skin protective behaviors may have increased or decreased over the 6-year period, findings may generate more research on the efficacy of skin cancer prevention programs. If a decline in sunscreen is observed, further research may address the possibility that women misunderstand the theories of skin cancer reported in the media and on the Internet, and are more apt to believe they have no control over contracting the disease (Dar-Nimrod et al., 2014). This misconception is possible as more and more genetic information, however inaccurate or unclear, is disseminated to the public (Dar-Nimrod & Heine, 2011; Waters et al., 2014). Further, the results of this study may generate research on the possible increase in indoor tanning device use related to the increase in skin cancer among women. Although the literature indicated that women want to look attractive, they may benefit from mass media communications about how carcinogenic tanning devices are (Noar et al., 2014). One study, described below, attests to the efficacy of informed educational programs, another to positive changes in skin cancer protective behaviors over time (Bagatti et al., 2016).

Bagatti, Englert, and Cline (2016) examined the proposition that education can affect women's attitudes and behaviors regarding melanoma. They hypothesized that

women would change their behavior if they knew about the risks of skin cancer. They disseminated information about melanoma to a convenience sample of 72 women college athletes and then tested them six months later regarding knowledge, attitudes, and behaviors. Bagatti et al. (2016) found that the women exhibited significant improvement in attitudes about, and knowledge of skin cancer as well as healthy behaviors (Kunin-Batson, Steele, Mertens, & Neglia, 2015; Taber & Aspinwall, 2015; Rat et al., 2015). The research underscores the need to educate the public about skin cancer and the effectiveness of informed preventive programs (Tripp et al., 2016). Volkov, Dobbinson, Wakefield, & Slevin (2013) conducted a longitudinal study of Australians ages 12 to 69 over the 7-year period from 2003/2004 to 2010/2011 regarding their sun-related attitudes, sun protection, and sunburn. The results indicated improvements over time with regard to skin cancer prevention attitudes and behaviors.

The following samples of research include a description of skin cancer, sunscreens, and tanning beds and booths; studies on the phenomenon that people resist healthy behaviors and medical treatment for various reasons, and the underlying motivations that make resistance occur; and an explanation of health self-efficacy theory and its relevance to this study, both as a foundational theory and as the independent variable.

Several online research services and programs were accessed for this literature review, from1954 to 2016, including PubMed, Medline, PsycINFO, Google Scholar, and the Walden Library dissertation database. Examples of the search topics were: *skin cancer, skin cancer and self-efficacy, self-efficacy, health self-efficacy, tanning booths,*

tanning beds, tanning devices, sunscreens, and skin cancer statistics, genetics and skin cancer. Out of hundreds of articles reviewed, 152 peer-reviewed journal articles, both current and seminal, books, agency and organization reports (such as the National Cancer Institute, the National Health Institute, and the American Cancer Society), and online news reports have been cited.

Skin Cancer

Skin cancer is mostly due to excessive exposure to ultraviolet (UV) radiation from the sun, and to a lesser degree from tanning beds and booths (Diao & Lee, 2014; Noar et al., 2014; Olsen, Carroll, & Whiteman, 2010). There are two types of UV radiation, UVA and UVB. The UVA rays are carcinogenic while the UVB rays are known to cause sunburn (American Academy of Dermatology, 2016). UV rays cause DNA changes deep within the cells of the skin (Berneburg et al., 2004). A person who gets sunburned every couple of years has tripled the likelihood of getting melanoma (Cancer Research, UK, 2016a). Cakir, Adamson, and Cingi (2012) have indicated that the shrinking ozone atmospheric layer provides less protection from the sun's UV radiation. The World Health Organization (WHO) has indicated that tanning beds and booths are as carcinogenic as tobacco and asbestos (El Ghissassi et al., 2009). A small proportion of people are genetically predisposed to contracting skin cancer and some have compromised immune systems that make them vulnerable to skin cancer, however these account for only approximately 10% of all skin cancer patients (Diao & Lee, 2014).

Skin cancer begins as a small bump, mole, or strange patch of skin anywhere on the body (Mayo Clinic, 2016). It is often found on the face, hands, arms, neck, and legs

because these are the areas that are the most exposed (Mayo Clinic, 2016). Basal-cell skin cancer (BCC) and squamous-cell skin cancer (SCC) are the two main types of nonmelanomas. BCC accounts for approximately 80% of all skin cancers and SCC accounts for the remainder (American Cancer Society, 2016e). Melanoma is less common than BCC and SCC (its incidence is calculated at approximately 1% of all skin cancers) but it is more aggressive and deadly because it is more metastatic (Skin Cancer Foundation, 2016). Melanoma accounts for 77% of all skin cancer related deaths (University of California School of Medicine, 2016). The average national mortality rate for melanoma is, on average, one person dying per hour (American Academy of Dermatology, 2016).

A biopsy is conducted to diagnose skin cancer (WebMD, 2016). Treatment depends upon the type and severity of the cancer (WebMD, 2016). The main treatment for early-diagnosed BCC and SCC types of skin cancer is most often minor surgery. If it has not been diagnosed early, or is the more serious melanoma, numerous mutilating operations and reconstructive surgeries as well as other cancer treatments may be required (Cancer Research, UK, 2016b; WebMD, 2016). In addition to disfiguring scaring as a result of surgery, individuals frequently experience psychological and psychosocial ramifications such as depression, anxiety, and loss of employment (Anderson & Frank, 2016). To illustrate, facial cancer may be devastating not only because of visible surgical scars but also because speech, sight, and smelling abilities may be compromised (Anderson & Franke, 2016). The deleterious effects do not just affect individuals: the yearly economic burden to our society is approximately

$8.1 billion. The indirect costs, including lost productivity is estimated at over $40 million per year (Tripp et al., 2016).

Protective Behaviors for Skin Cancer

People can avoid excessive UV radiation and thus prevent skin cancer by doing the following: limit exposure to the most intense light by going out in the sun primarily before 10:00 a.m. and after 4:00 p.m.; wear protective clothing such as tightly weaved garments, wide-brimmed hats, long-sleeve shirts, and wrap-around sunglasses; seek shade when outdoors; and use sunscreens and avoid indoor tanning devices (The American Cancer Society, 2016c). The current study focused on just two skin cancer protective behaviors, sunscreen use and the use of tanning beds and booths, the avoidance of which is a protective behavior.

Theoretical Framework

The theoretical framework for the first two research questions is health self-efficacy. Self-efficacy is a psychological concept that attempts to explain people's attitudes and behaviors with regard to medical treatment and their acting against their own self-interest when it comes to self-care. It is one of several personal health care theories as described below.

Health self-efficacy is a progeny of the groundbreaking work in the early 1950's by social psychologists Irwin M. Rosenstock, Godfrey M. Hochbaum, and S. Stephen Kegels (Rosenstock, 1974). They developed the seminal health theory known as Health Belief Model (HBM) to articulate their observations of patients who often skipped screenings and did not fully participate in health services (Champion & Skinner, 2008;

Glanz, Rimer, & Lewis, 2008). Health self-efficacy is used in the current study rather than HBM because one of the main propositions of HBM focuses on a person's perceptions of barriers to health care compliance, a factor not considered in the current study.

There are other theories that have attempted to explain the phenomenon of disparate attitudes and behaviors that people exhibit with regard to their health, e.g., The Theory of Planned Behavior (Pertl et al., 2010). The phenomenon has been studied in a variety of individuals having a variety of conditions and diseases, including skin cancer, as detailed below (Diao & Lee, 2013). The overarching premise is that people can hold beliefs that may not be entirely reasonable but which nevertheless predict their behavior with regard to their health.

Several studies are highlighted to exemplify the examination of various underlying motivations, besides health self-efficacy, which attempt to understand people's risky behaviors relative to skin cancer (Dar-Nimrod & Heine, 2011; Pertl et al., 2010; Synowiec-Pilat, 2015; Wang & Coups, 2010). For instance, Janssen, Waters, van Osch**,** Lechner, and de Vries (2014) conducted a longitudinal study to understand how people's attitudes and behavior depend upon their feelings by studying the sun screen protection activities among Netherland adults. Their study was premised upon the general perception that people will participate in healthy behaviors if they understand that they are at risk for a disease. Jansen et al. (2014) examined the difference in the healthy behaviors, defined as the intentions to use and actual use of sunscreens, between those who *felt* (feared) they were at risk and those who *thought* (cognitive beliefs) they were at

risk for skin cancer. Feelings were defined as affective likelihood, worry, and anticipated regret – how they imagined they would feel if they contracted skin cancer due to their risky behaviors (affective risk beliefs). Janssen et al. (2014) found that among the 436 respondents surveyed about their sunscreen intentions and use, there was a positive correlation between reported *feelings* regarding being at risk for skin cancer and actual sunscreen use. Alternatively, respondents who had higher *cognitive* beliefs in their cancer risks evinced more intentionality to use sunscreen rather than actually used sunscreen. Jansen et al. (2014) concluded that people are motivated to act in healthy ways because of their feelings, their fears, and not their rational thoughts regarding their actual skin cancer risks and that this information is useful for cancer intervention programs. The conclusion that people do not always act rationally underscores the need to educate people to protect themselves from skin cancer (Diao & Lee, 2013**;** Kivineimi & Ellis, 2014; Mahler, 2015).

Heckman et al. (2012) surveyed 509 female undergraduate students, 18-25 years old, to examine the relationship between attitudes regarding tanning, sunburns, and skin cancer and using sunscreen and protective clothing. The females were classified in terms of the self-reported color of their skin, the range going from very fair to very dark. One of the results was that those with fair skin were more likely to report having sunburns, having a greater appreciation of being tan (appearance enhancement), having lower feelings of control with regard to skin protection, and more frequent sunscreen use. Contradictions were apparent in fair skinned women who were more likely to contract skin cancer: they did not limit their sunbathing but did use sunscreen.

A study by Bagatti, Englert, and Cline (2016) indicated the possibility that warnings that targeted women's lack of education about skin cancer can affect their attitudes and behavior regarding melanoma. Bagatti et al. theorized that women would change their behavior if they knew about skin cancer risks. They disseminated information about melanoma to a convenience sample of 72 college athletes and then tested them six months later regarding their knowledge, attitudes, and behaviors. Bagatti et al. found that the women exhibited significant improvement in attitudes about, and knowledge of skin cancer as well as healthy skin care behaviors (see Kunin-Batson, Steele, Mertens, & Neglia, 2015; Taber & Aspinwall, 2015; Rat et al., 2014). The research underscores the effectiveness of informed preventive programs (Tripp et al, 2016). The American Cancer Society (2016d) is in accord and has stated that skin cancer can be significantly reduced through education, lifestyle changes, and early detection. More work needs to be done to develop creative programs because at least one study has determined that protective behaviors have in fact declined: Basch, Basch, Rajan, and Ruggles (2014) studied the skin-protection behaviors of adolescents from 2001 to 2011. They found that the use of sunscreen actually declined, from 67.7% to 56.1 %.

Theory of Health Self-Efficacy

I chose to base the first two research questions on the theory of health self-efficacy. Health self-efficacy is a derivative of the work of Bandura (1977). Bandura theorized the concept of self-efficacy, which is a person's beliefs about achieving a goal, is based largely upon the *belief* that they have the capability to do so. Goal-setting, motivation, and self-management are elements of self-efficacy (Bandura, 1977). Self-

efficacy is a derivative of Bandura's social cognitive theory. Social cognitive theory (SCT), originally called social learning theory, refers to the idea that people learn from observing others' behaviors and the consequent rewards or punishments. SCT relates to self-efficacy because it is understood that people often base their beliefs of self-efficacy on their perceptions of others being successful in achieving their goals (Bandura & National Institute of Mental Health, 1986). Self-efficacy is understood as affecting how people approach life's challenges such that people with a high sense of self-efficacy tend to be optimistic about their abilities and will more readily take on and succeed at tasks and not seek to avoid them whereas low self-efficacy leads to more limited goals and less success (Bandura, 1977; Luszcynska & Schwarzer, 2005). Self-efficacy is an explanation of people's behavior in a variety of situations including: academia, wherein self-efficacy relates to people's academic performance (Jimenez, 2006); social self-efficacy, which relates to people's pro-social behaviors (Grieve, Witteveen, Tolan, & Jacobson, 2014); and technical self-efficacy, which regards people's learning computer programming (Brauner, Leonhardt, Ziefle, & Schroeder, 2010).

Health self-efficacy, which is self-efficacy relating to health self-care, is germane to the current study because it concerns a person's belief that he or she has the ability to avoid skin cancer through specific protective behaviors (Bandura & National Institute of Mental Health, 1986). According to Conner and Norman (2005) health self-efficacy concerns people's beliefs in personal power as it relates to their health decisions including disease prevention and management, and health goals (Chen & Lin, 2010; Ronzio & Ronzio, 2012). It explains people's health choices, how optimistic they feel

about achieving their goals, and how likely they believe they can overcome barriers to success (Luszcynska & Schwarzer, 2005). Health self-efficacy has been instrumental in explaining people's attitudes and behaviors regarding various health issues, for example dental hygiene, nutrition, seat belt use, and cigarette smoking cessation (Conner & Norman, 2005). Luszcynska and Schwarzer (2005) concluded that a person's level of success in self-care could be predicted based upon his or her level of health self-efficacy.

For over half a century, research has consistently indicated that how people perceive their abilities to control their medical issues predicts their actual health behaviors. People's protective behaviors regarding skin cancer have been explained by the theory of health self-efficacy (Robinson et al., 2004). Kamimura et al. (2015) surveyed 551 low-income and uninsured patients in a primary care clinic in Utah to determine their skin cancer attitudes and protective behaviors. Kamimura et al. (2015) hypothesized that the three predictor variables of self-efficacy, perceived susceptibility, and skin cancer awareness could be correlated with skin cancer protective behaviors. A HINTS survey was the source of the data and included information about the sample's use of sunscreen, use of protective clothing (long pants, hat, and long-sleeve shirt), and avoidance of excessive sun exposure by staying in shade. Kamimura et al. (2015) found that self-efficacy and skin cancer awareness were predictors of skin cancer protective behaviors. Sunscreens were found to be used the least and Kamimura et al. (2015) speculated that this may be because they are expensive compared to wearing long-sleeve shirts and pants.

Protective Behaviors (Dependent Variables)

The first two research questions regard the influence of feelings of health self-efficacy on two dependent variables, the use of sunscreen and tanning behavior. Because indoor tanning devices are considered carcinogenic, the avoidance of their use is considered as skin cancer protective behavior (Centers for Disease Control and Prevention, 2016c; Diao & Lee, 2014).

Sunscreens

Sunscreens are available as topical lotions, gels, and sprays and are placed on a person's body to prevent UV rays from reaching and possibly damaging the skin (Cancer Research, UK, 2016). They are also known by other names such as block out, sun cream, and sunblock (Cancer Research, UK, 2016). Sunscreens come in varying levels of protection from UV radiation, some for just UVA rays and some for both UVA and UVB rays, known as broad-spectrum sunscreens (American Cancer Society, 2016d). The American Academy of Dermatology (2016) suggests that the best sunscreen is a broad-spectrum (UVA and UVB) waterproof sunscreen with a Sun Protection Factor (SPF) of 30 or greater. One must use sunscreens according to the directions on the packaging and apply them generously and frequently. While in at least one study, sunscreens have been shown to be effective in reducing the incidence of melanoma, they are by no means 100% effective (Cancer Research, UK, 2016; Green, Williams, Logan, & Strutton, 2011). The American Cancer Society (2016d) stated that is a mistake to think that the use of sunscreens permits one to have unlimited sun exposure; excessive sunbathing and

sunburns have been seen in those who use SPF sunscreens (Autier, Boniol, & Jean-Francois, 2007).

People consider sunscreens affordable (only one study of uninsured, clinic patients indicated that people limited their use of sunscreen because it was too expensive [Kamimura et al., 2015]). Sunscreens can range in price from $0.63 per ounce for Wal-Mart's Equate Ultra Protection SPF 50 ("Consumer Reports Best Buy") to $5.52 per ounce for Badger Unscented SPF 34 lotion (Jaslow, 2013). Some sunscreen labels exaggerate their potency (Jaslow, 2013). In June 2013, the U. S. Food and Drug Administration (FDA) issued regulations that required sunscreen manufacturers to be more honest about SPF protection claims (Jaslow, 2013).

The National Cancer Institute 2000-2010 survey data indicated that 13% of men and 33% of women 18-24 years of age used sunscreen and 21.8% of men and 42.1% of women over 25 used sunscreen (National Cancer Institute, 2010). He (2014) used HINTS 2012 survey data to examine the use of sunscreen as it related to the respondents' health self-efficacy and locus of control. He (2014) found that individuals with a high external sense of locus of control (relatively little self-control and personal responsibility beliefs) were less likely to use sunscreen and individuals with high beliefs of health self-efficacy were more likely to use sunscreen. These findings with regard to self-efficacy were consistent with studies by both Pertl et al. (2010) and Heckman et al. (2012). He (2014) also found that there are two widely-held, erroneous beliefs: (a) that skin cancer is primarily inherited, and (b) that therefore it is futile to use sunscreen or avoid excessive sun exposure, an attitude that is a form of fatalism (Espinosa de Los Monteros & Gallo,

2011). He's (2014) study was similar to the current study; however, I could only find it published as an abbreviated Abstract that was presented at a conference, the focus was the general population, not on young adult women, and only sunscreen use was examined.

Pertl et al. (2010) studied women (*n*=590) and their beliefs of self-efficacy and controllability (perceived control and locus of control) for predicting sunscreen use. Overall, sunscreen use was found to be very limited. The greater the women's self-efficacy, the more likely they were to report an intentionality to use sunscreen. Pertl et al. (2010) suggested that future research was needed to understand the concepts of self-efficacy and controllability as they affect skin cancer behaviors. Pertl et al.'s (2010) research is dissimilar to the current study because, among other things, the number of women surveyed was far smaller by several thousand.

Indoor Tanning Devices

Indoor tanning devices have become increasingly popular despite they're being carcinogenic (Coups, Geller, & Pagoto, 2016; Waters & Adamson, 2016; Wehner et al., 2012). There are two indoor tanning devices, tanning beds and booths, which are used mainly for cosmetic reasons – to darken one's skin and thus produce a tan that many perceive as youthful and attractive (Noar, Myrick, Morales-Pico, & Thomas, 2014). A person lies down in a tanning bed or stands up in a booth for a specified amount of time and he or she uses one device or another during a tanning session. Both devices emit UV radiation said to be similar to sunshine; however, tanning beds and booths release approximately 5-15 times greater UV radiation than the midday, summer sun (Balk &

Geller, 2008; Berwick, 2008). Due to changes in tanning bed and booth equipment over the past years, it is difficult to accurately quantify and thus regulate the spectral output of these devices (Balk & Geller, 2008; Berwick, 2008). UV exposure is much greater with indoor tanning device use because over 95-100% of the body is exposed versus only 15-50% of the body when one is outdoors (Berwick, 2008).

Manufacturers, tanning salon owners, and some medical providers promote indoor tanning devices for health and fitness and claim they are at least as safe as sunshine (Berwick, 2008; Schulman & Fisher, 2009). Two assertions, not empirically proven, are that tanning beds and booths increase a person's vitamin D production and can be a treatment for seasonal affective disorder or SAD (Berwick, 2008; Saeed & Bruce, 1998; Tangpricha et al., 2004; Woo & Edie, 2010). However, the Centers for Disease Control and Prevention (2016c) have declared that indoor tanning devices are carcinogenic. The World Health Organization (WHO), International Agency for Research on Cancer, reported that tanning devices are "carcinogenic to humans" and placed them in its highest cancer risk category, Class 1 (El Ghissassi et al., 2009). Waters & Adamson (2016) determined as a result of their study of cancer caused by tanning device use that approximately 9,000 melanomas and more than 255,000 non-melanoma skin cancers were attributable to indoor tanning devices. Indoor tanning has become an epidemic among teenage girls and young adult women in the last 20 years because it has been estimated that 10% of skin cancer cases are caused by tanning booths and beds (Coups, Geller, & Pagoto, 2016; Waters & Adamson, 2016; Wehner et al., 2014). Estimates for the increased likelihood of contracting non-melanoma skin cancer by using indoor

tanning devices range from 29-67% and for melanoma by 20% (Boniol, Autier, Boyle, & Gandini, 2012; Wehner et al., 2012). Lazovich et al. (2016) determined that indoor tanning devices caused a six-fold increase in melanoma for women younger than 30 years of age. Each year, approximately 450,000 cases of skin cancer are diagnosed due to tanning device use; the number of cancer cases as a result of tanning device use is greater than the number of lung cancer cases caused by smoking cigarettes (Wehner et al., 2014). Waters & Adamson (2016) estimate that in the United States, the annual cost of direct medical care for those who develop skin cancer due to indoor tanning device use is $343.1 million, which represents a cost of $127.3 billion over their lifetimes.

Tanning beds and booths are very popular: at least 20% of adolescents in the United States have used an indoor tanning device at least once (Dore & Chignol, 2012; Pan & Geller, 2015). In 2004, Wolff System Technology published survey results indicating that in the United States, there are 30 million users (approximately 10% of the entire population): 13% are teenagers, 20.4% are young adults (18-29 years), 13% are adults (30-64 years), and 9.8% are older adults (65+ years). The National Cancer Institute's 2013 survey regarding indoor tanning device use resulted in these statistics: 16.2% of women ages 18-24 years and 5.5% of females over 25 years reported using an indoor tanning device during the previous year; and, 2.3% of males 18-24 years and 1.7% of men older than 25 years used an indoor tanning device within the previous year (National Cancer Institute, 2016b). A study by Knight, Kirincich, Farmer, and Hood (2002) indicated that young women used tanning devices despite knowing of the carcinogenic risks. Some of the reasons behind young adults' use of indoor tanning

devices are: the belief that they look more attractive and healthier with a tan, that their friends do it, and that it is okay to get burned in order to achieve a tan (Noar, Myrick, Morales-Pico, & Thomas, 2014; Geller, 2002).

The U.S. Food and Drug Administration (FDA), the Federal Trade Commission (FTC), and individual states regulate indoor tanning devices. The regulations cover, for instance, the minimum age of the tanner, the manufacture and sale of devices, lamp replacement, and maximum lamp exposure compliance (Mays, Murphy, Bubly, Atkins, & Tercyak, 2016; Pan & Geller, 2015). In fact, 11 states and the District of Columbia have laws which restrict the use of indoor tanning booths and beds to those over 18 years of age (Pan & Geller, 2015). Several states prohibit use by adolescents who are between the age of 14 and 18 unless they have parental consent (Pan & Geller, 2015). Opponents to indoor tanning devices are proposing increasingly restrictive regulations: the banning all indoor tanning device use by minors and regulations similar to those for cigarettes, which are well-known carcinogens (American Cancer Society, 2016e; Mays et al., 2016; Pan & Geller, 2015).

Pertl et al. (2010) conducted a study with regard to the influence of self-efficacy and controllability on the use sunscreen and indoor tanning devices. They found no correlation between the intention to use tanning beds and controllability and suggested peer pressure to look good with a tan was a factor impacting these results.

Noar et al. (2014) examined young adult women's attitudes about indoor tanning device use. They developed their own online survey to interview 706 university women ages 18-25, the Comprehensive Indoor Tanning Expectations (CITE) scale, to understand

why they used indoor tanning devices. The results indicated that motivating factors were appearance, perceptions of convenience, mood enhancement, and health improvement. Noar et al. (2014) noted that the results could not be generalized and that a limited amount of literature regarding interventions for tanners is available.

Predictor of Protective Behavior (Independent Variable)

In the current study, the single independent variable (predictor) is health self-efficacy (Berglund, Lytsy, & Westerling, 2014; Kamimura et al., 2015; Wang & Coups, 2010). The proposition is that beliefs of health self-efficacy may predict the dependent variables of the use of sunscreen and the use of indoor tanning devices (the avoidance of which is a skin protective behavior) (see Robinson et al., 2004). I chose this independent variable because, as reflected in the literature, a focus on health self-efficacy as an underlying factor regarding skin cancer attitudes and behaviors may assist in developing skin cancer preventive interventions (see Diao & Lee, 2013; Waters, Muff, & Hamilton, 2014). Mahler (2015) stated that we need to understand the emotions underlying people's risk-taking regarding skin cancer to develop interventions that will encourage behavioral change.

Self-efficacy is the concept used to explain a person's belief that he or she can achieve a particular goal. If one's self-efficacy for weight loss is low, it is less probable that she will be succeed in a weight-loss program (Nahar et al., 2014). The psychological concept of self-efficacy was first theorized by Bandura (1977). Health self-efficacy, a subdivision of the theory of self-efficacy, is valuable as a possible predictor because it may explain, in part, the disparity between people's skin cancer risks and their

ambivalence about protecting themselves (Nahar et al., 2014, Pertl et al., 2010). Nahar et al. (2013) conducted a study of sun protective behaviors of 109 landscape workers in North Mississippi. These workers were chosen as representatives of millions of U.S. workers, who as a result of working outdoors, are exposed to high levels of UV radiation. Nahar et al. (2013) concluded that the workers used sunscreen when they perceived the benefits as outweighing the barriers. Nahar et al. (2013) determined that the workers' beliefs in self-efficacy was an important factor in predicting sun protective behaviors. The results of this study contribute to knowledge about skin cancer protective behaviors for outdoor workers who are especially vulnerable.

The above studies highlight people's ambivalence regarding skin cancer. The purpose of previous studies and the current study is the same: to acquire information that will lead to education programs and that will ultimately reduce the incidence of skin cancer. The current study examined women's beliefs in health self-efficacy and how these beliefs may predict their sun-safe behaviors with regard to skin cancer. The goal is to use the results and conclusions to inform skin cancer educational programs designed to assist the public in understanding the risks of skin cancer and what they can do to prevent it (Volkov, Dobbinson, Wakefield, & Slevin, 2013).

The third research question in the current study addressed whether there are trends in skin cancer protective behaviors as reported by women in the 2008 HINTS and 2014 HINTS 4 surveys (Basch, Basch, Rajan, & Ruggles, 2014). Just their behaviors were examined; health self-efficacy as an independent variable was not considered.

Summary and Conclusions

In summary, the major themes in the literature are that (a) there is a phenomenon that exists whereby people do not always act in their best interests to prevent skin cancer; (b) underlying attitudes and behaviors can be studied to shed light on what predicts people behaving in risky or reasonable ways regarding skin cancer; (c) health self-efficacy has been shown to be a possible motivating factor; and (d) various methods and theoretical frameworks have been used by researchers to examine these motivating factors. I found no study that did not suggest that further research was needed to help in our understanding the dynamics of people's contradictory attitudes and behavior.

While there is literature which addresses the role of people's beliefs and attitudes regarding skin cancer, there is a need for a broad-based study focusing on women, ages 18-34, who are particularly vulnerable, and how their unique beliefs and attitudes, including the need to look attractive with a tan, impact their proactive health behaviors (Ch'ng & Glendon, 2013; Heckman et al., 2012). The results of the first two research questions in the current study may lead to a better understanding of women's underlying motivations regarding self-care. The results may not only help individuals but also inform the medical community as to how best to educate women about ways to avoid skin cancer, possible disfigurement, and even death (see Bagatti, et al., 2016; Cline, 2016; Mahler, 2015).

The third research question was designed to compare the skin cancer protective behaviors as reported by the women in the 2008 HINTS and the 2014 HINTS surveys. The changes may further assist in our determination of the necessity for interventions to

prevent skin cancer. For instance, if it is determined that women use less sunscreen in 2014 than in 2008, and given what we know about a U.S. burgeoning skin cancer epidemic, this information could underpin a government-sponsored promotion of sunscreen use (see Volkov, Dobbinson, Wakefield, & Slevin, 2013).

Chapter Three outlines the methodology used in this study: I analyzed the 2014 HINTS national survey data of several thousand women, using a simple linear regression statistical analysis to determine whether there is a correlational relationship between the independent variable (predictor) of health self-efficacy and the dependent variables of sunscreen use and tanning beds and booths. I conducted a MANOVA statistical analysis of the 2008 HINTS and the 2014 HINTS to determine changes, if any, with regard to the protective behaviors of sunscreen use and tanning bed and booth use over the six year period.

Chapter 3: Research Method

At the time of the current study, there had been few studies addressing the possible motivations to use skin cancer protective measures among women ages 18-34. Studies indicated that more research needs to be conducted to understand motivational factors to develop preventive educational programs and save lives (Ch'ng & Glendon, 2013; Heckman et al., 2012). The first two research questions addressed a gap in the literature through analysis of 2014 HINTS survey data on U.S. women ages 18 to 34 to examine possible underlying motivations for engaging in skin protective behaviors. The purpose was to examine the possible effect of health self-efficacy on skin protective behaviors (use of sunscreen and avoidance of indoor tanning devices). Another gap was addressed by the third research question through analysis of possible trends in women's use of sunscreen and tanning beds and booths between the 2008 HINTS and 2014 HINTS survey data. This chapter includes the study's research design and methodology, sampling data and collection and analysis, and ethical considerations.

Research Design and Rationale

I determined that nonexperimental, quantitative methodology was appropriate for the data collection and analysis to answer the three research questions. Archival data were collected from the 2014 Health Information National Trends Survey (HINTS) 4, Cycle 4 and the 2008 HINTS 3 survey. Quantitative methodology, a deductive approach, was used to test hypotheses related to the research questions. The generalizability of results is limited to U.S. women ages 18-34 in 2008 and 2014 (see Creswell, 2014; Fowler, 2009).

According to Creswell (2014), the quantitative method is appropriate to answer research questions that require collection of quantitative data. The purpose of the first two research questions was to determine whether self-efficacy, the independent variable, predicted women's use of sunscreen and avoidance of indoor tanning devices, the dependent variables. Simple linear regression was used to analyze the data.

The third research question addressed possible trends over a 6-year period. The data for women from the 2008 HINTS and 2014 HINTS surveys concerning their skin cancer protective behaviors were compared and contrasted using descriptive statistics, including mean comparisons, frequencies, and standard deviations, to simplify, organize, and summarize the data (see Gravetter & Wallnau, 2009). Additionally, MANOVAs were conducted to determine whether there were statistically significant differences between the sample means of the women's responses over the 6 years (see Basch et al., 2014; Pallant, 2010).

Archival Research Methodology

The current study included archival data from the 2008 HINTS and 2014 HINTS surveys. These data were accessed for free from the HINTS website. HINTS surveys are biennial, cross-sectional surveys of a nationally representative, probability-based sample of U.S. adults (18+ years), which began in 2003 (Cantor et al., 2005). The HINTS surveys were developed by the Health Communication and Informatics Research Branch, Division of Cancer Control and Population Science at the National Cancer Institute. The HINTS focus is cancer and includes questions regarding not only types and incidence of cancer, but also people's attitudes toward the disease and where they obtain medical

information. The primary goals for the HINTS are to "(a) encourage programmatic and interdisciplinary approaches to cancer communication research, and (b) to accelerate development of innovative health communication models, theories, and research strategies in cancer prevention, control, and care" (Cantor et al., 2005, p. 1-1). The HINTS questions were developed by NCI experts and consultants with a focus on being easily understood and completed in the least amount of time (Cantor et al., 2005). The questions were taken from many sources including cancer research data and literature reviews, existing questionnaires, cognitive testing results, and timing data (Cantor et al., 2005).

The HINTS survey data were chosen for the three research questions in the current study because of the extensive U.S. population surveyed and the fact that the survey had been rigorously developed for high levels of reliability and validity (Finney Rutten et al., 2012). Regarding the trends aspect of this study, HINTS surveys were specifically designed to "enable researchers to track changes in cognitive and behavioral outcomes" (Cantor, et al., 2005, p. 2-1). The use of HINTS data is practical and economical because the data are free and readily available online. The only condition to using the HINTS data is that a researcher has to agree to the HINTS data terms of use.

Participants

The NCI published online information for the 2008 HINTS and 2014 HINTS surveys, including the total number of respondents for each iteration. The data set for the 2014 HINTS survey included 3,677 respondents; the 2008 HINTS survey included 3,582 respondents (Cantor et al., 2005; NCI, 2015). The total number of women ages 18-34 was

731 for 2008 and 323 for 2014. The rationale for examining this cohort was that young adult women are highly vulnerable to skin cancer and are known to participate, in proportionally large numbers, in excessive sun tanning, particularly indoor tanning device use (American Cancer Society, 2016a; North American Association of Central Cancer Registries, 2016).

Power Analysis

To determine a minimum sample size for this study, I conducted an *a priori* power analysis. The online statistical program G*Power was used for this power analysis with one predictor (alpha = .05, power = .80, and medium effect size $f^2 = .15$) (Faul et al., 2009). The minimum sample size to satisfy power criteria for the three research questions was 100 respondents.

Recruitment, Participation, and Data Collection

To maintain sufficient response rates since 2003, NCI and HINTS incorporated new modes of data collection into the original methodology regarding contacting and interviewing participants, acknowledging the impact of new modes of communication including the Internet and mobile phones (Cantor et al., 2005). After extensive research and several pilot studies, NCI and HINTS determined that a "mixed-mode" survey methodology was the most effective. Internet questionnaires alone were unworkable because of the inherent biases and errors, e.g., a "digital divide" exists wherein only better educated and wealthier participants have greater access to the internet. For the 2008 HINTS, again after extensive research and pilot studies and a limited response rate, internet contact was eliminated altogether. Respondents were thereafter contacted only by

telephone and mail; this is known as a dual-frame survey design as described below (Cantor et al., 2005; Cantor et al., 2009). The 2014 HINTS survey was conducted by mail only, again to increase response rates. For all surveys, Spanish speaking interviewers and Spanish language questionnaires were used when necessary (Cantor et al., 2009; NCI, 2015). The goal for both the 2008 HINTS and 2014 HINTS surveys was to obtain 3,500 completed questionnaires (Cantor et al., 2009; NCI, 2015).

2008 HINTS

The population NCI surveyed was considered single-stage whereby the NCI targeted and contacted the sample respondents directly, by mail and telephone – a dual-frame design (Cantor et al., 2009; see Creswell, 2014). The sample was randomly chosen and was probability based, meaning that each respondent had an equal opportunity to be chosen (see Creswell, 2014). The first frame was the use of telephones to contact the participants and the second frame involved contacting the respondents by mail. These two modes were chosen to enhance the response rates, especially for those who only have unlisted mobile phones and could only be reached by mail. The mail mode was designed to maximize responses and minimize nonresponse bias.

For the telephone contact, the first frame, the respondents were chosen using list-assisted, random digit dialing (RDD). The Computer Assisted Telephone Interview (CATI) format was used for the telephone interviews, with trained interviewers asking the questions. The telephone numbers were randomly chosen from “working banks” which are lists of 100 telephone numbers in specific area code exchanges. Out of a total number of 88,530 telephone numbers, after excluding business numbers and nonworking

numbers, and matching them with addresses, the final subsample was a total of 80,231 telephone numbers (Cantor et al., 2009). NCI sent a letter to the sample residents prior to the telephone contact, to apprise the household that an interviewer would be calling them. This mailing included a $2.00 incentive (Cantor et al., 2009). NCI wanted to achieve 3,500 completed responses; it obtained 3,767 completed interviews and 325 partially completed interviews for a total of 4,092. The response rate after NCI computations for standardization according to The American Association for Public Opinion Research (AAPOR) was 42.37%.

For the second frame, the mail contact, NCI randomly chose the respondents using addresses obtained from the U. S. Postal Service administrative records (Cantor, et al., 2009). A week after the advance letter describing the survey was sent, NCI sent a the survey package (with a $2.00 incentive), which included several questionnaires to be completed by all household adults. Two weeks later, NCI sent a postcard reminder to homes from which a completed survey had not been received. If there were still no response, NCI sent a second set of questionnaires by FedEx. A total of 7,851 homes were contacted; data were collected from 3,582 respondents (Cantor et al., 2009). The overall response rate was calculated as 30.99% (Cantor et al., 2009).

2014 HINTS

By 2014, NCI had determined that only mailed questionnaires, including a $2.00 incentive, was the best way to obtain participation (NCI, 2015). They used a two-stage design: in the first stage, a stratified sample of addresses was chosen from a list of residential addresses; in the second stage, one adult was selected from within each

residence, in contrast to the 2008 HINTS wherein several adults in the household were included in the sample. The same sampling frame from the U. S. Postal Service as the 2008 HINTS was used (NCI, 2015). The final sample size was 13,996 (NCI, 2015). Complete data were collected from 3,677 respondents. The overall response rate was calculated as 34.62% (NCI, 2015). The mailing protocol included four mailings, the first of which was a cover letter with the questionnaire, $2.00, and a return envelope, The second mailing was a reminder postcard. The two remaining mailings each contained a cover letter, questionnaire, and return envelope.

Study Variables

I chose the independent variable and the two dependent variables for the first two research questions based upon the questions regarding skin cancer in the 2014 HINTS and the current literature in the field. The independent variable for both research questions was health self-efficacy. It was measured by the women's responses to the health self-efficacy question, "Overall, how confident are you about your ability to take care of yourself?" The responses were measured on a Likert scale, with the response being one of the following: 1. completely confident; 2. very confident; 3. somewhat confident; 4. a little confident; and 5. not confident at all. The dependent variable in the first research question was the use of sunscreen as measured by the women's responses to the question, "When you are outside for more than one hour on a warm, sunny day, how often do you wear sunscreen? The responses were measured on a Likert scale with one response required from the following six choices: Would you say…1. always; 2. often; 3. sometimes; 4. rarely; 5. never; and 6. does not go out on a sunny day. The dependent

variable in the second research question was the use of tanning beds and booths as measured by the women's responses to the question, "How many times in the past 12 months have you used a tanning bed or booth?" The Likert scale response was one of the following response options: 1. 0 times; 2. 1-2 times; 3. 3-10 times; 4. 11-24 times; and 5. 25 times or more.

I examined the possible changes in women's skin cancer protective behaviors over a six-year period with the third research question. The data from the 2008 HINTS and the 2014 HINTS surveys were compared (see Basch et al., 2014). Responses were measured by the women's answers to the two questions in the 2008 HINTS survey, "When you go outside during the summer on a warm sunny day, how often do you do each of the following…wear sunscreen?" The Likert scale response was one of the following options: 1. always; 2. often; 3. sometimes; 4. rarely; 5. never; 6. does not go out on a sunny day; and, "How many times in the past 12 months have you…used a tanning bed or booth? The Likert scale response were one of the following options: 1. 0 times; 1. 1-2 times; 3. 3-10 times; 4. 11-24 times; and 5. 25 times or more. Sunscreen use and tanning bed and booth use questions for the 2014 HINTS survey were measured, using a Likert scale, by answers to the questions, "When you are outside for more than one hour on a warm, sunny day, how often do you wear sunscreen?" One response was required from the six choices: 1. Always; 2. often; 3. sometimes; rarely; never; does not go out on a sunny day; and, "How many times in the past 12 months have you used a tanning bed or booth?" One response was required from the six choices: 1. 0 times; 2. 1-2 times; 3. 3-10 times; 4. 11-24 times; and 25 times or more.

Data Analysis

Preliminary Analyses

The data analysis comprised two phases, preliminary and main. In the preliminary analysis, I determined the means, frequencies, and standard deviations (descriptive statistics) for both the 2008 HINTS and 2014 HINTS data for the independent variable and the two dependent variables. Further, I checked the data for reasonableness, I cleaned the data as necessary, which included correcting for missing values and responses that were not in the specified range (Pallant, 2010). The SPSS program identified out-of-range or misnumbered responses (Creswell, 2012).

In addition, I calculated the descriptive statistics of the sample of women in the current study for the demographic variables, besides age, of race/ethnicity, socio-economic status (SES), and education. Because these demographic statistics are categorical, only the mode was calculated (Creswell, 2012). Finally, certain assumptions were made and corrected if violated.

Assumptions. Statistical assumptions are important to assess the accuracy of the data analyses and the conclusions therefrom (Field, 2009). Because this study uses secondary data, some of these assumptions have been addressed by the NCI, which developed the HINTS surveys. Generally, the initial assumptions verified for both the linear regression and MANOVA statistical analyses were: sample size, level of measurement, random sampling, independence of observations, normal distribution, and homogeneity of variance (Pallant, 2010). Sample size will be discussed in detail below.

The level of measurement refers to the fact that the dependent variables, sunscreen use and tanning bed and booth use, are measured at the interval level; the concepts are designed to be continuous and not categorical for statistical analyses purposes (Pallant, 2010). A random sampling means that each respondent has an equal chance of being selected (Gravetter & Wallnau, 2009). It is assumed that NCI, the agency that developed the HINTS surveys, chose the participants in a random manner (see discussions above, Archival Research Methodology and Participants). Independence of observations is a concept meaning that individual measurements cannot be influenced by any other. This appears to not be an issue because as reported by the NCI, each survey respondent was interviewed separately and had no information with regard to what any other respondent was reporting (Pallant, 2010). A normal distribution assumption means that it is understood that the population from which the sample is taken is normally distributed. This is also an issue for which reliance must be placed on the NCI. Finally, homogeneity of variance is an assumption that is germane to the t-test analysis for the third research question that requires comparison of two groups. It states that the variances (the mean squared deviation) of the two samples must be similar (Gravetter & Wallanu, 2009; Pallant, 2010). If they are not similar, the SPSS program will automatically perform the Levene's test for equality of variances when it conducts the t-test (Pallant, 2010). If the homogeneity of variance assumption is not satisfied, a different statistical analysis may be required, one that does not require equal variances (Gravetter & Wallanu, 2009).

The next assumptions to be considered were the absence of outliers and the absence of multicollinearity (Field, 2009). First, outliers are very high or very low scores (Pallant, 2010). When found, they can be deleted or given more a score more in line with the remaining scores (Pallant, 2010). Multicollinearity refers to the relationships among the independent variables (Pallant, 2010). Multicollinearity is a highly linear relationship among the independent variables, which means the independent variables correlate too much (Field, 2009). Multicollinearity can be detected using the Variance Inflation Factors (VIF). This analysis, according to Tabachnick & Fidell (2012), can determine how much influence the independent variables have over the dependent variable because of collinearity. If this VIF value is too high, that is over two, then the linear relationships of the independent variables may need adjustments, including perhaps eliminating some of the questions. Violations of the remaining assumptions for simple linear regressions were evaluated and rectified, as necessary: normality, linearity, homoscedasticy, and independence of errors (Field, 2009; Pallant, 2010). A residuals scatterplot or a histogram is used to access the assumptions of normality, linearity, and homoscedasticy, which refer to the relationships among the independent variables and the distribution of the scores (Pallant, 2010). One can see whether the scores are normally distributed (Pallant, 2010; Tabachnick & Fidell, 2012). If the assumption of normality is violated, the variable scores will deviate from the normal model so that they are skewed. If a greater number of scores is above the mean this is known as negative skewness, while if a greater number of scores is below the mean, this is positive skewness. A logarithmic transformation can be

used to rectify large deviations from the norm and for small deviations a square root transformation can be applied (Tabachnick & Fidell, 2012).

Linearity, which affects the generalizability of the results, is an assumption that suggests that there is a straight-line relationship between the dependent variable and the errors of prediction (Field, 2009). If there is insufficient linearity, it will be obvious in a scatter plot if the scores create a curve rather than a straight line (Pallant, 2010). If nonlinearity exists, a solution would be to add the values of the squares of the independent variables in the regression analysis (Tabachnick & Fidell, 2012).

Homoscedasticity is an assumption that the standard deviations of the errors of the normal model and of the actual scores are similar. If this assumption is violated, the study's standard deviation of errors is difficult to assess (Tabachnick & Fidell, 2012). In a scatterplot, the scores should show a cigar shape (Pallant, 2010). If the assumption is violated, three different statistical analyses may rectify the situation: transforming the variables, including a variable that is not part of the original model, or conducting a program using weighted least squares regression (Tabachnick & Fidell, 2012).

Finally, the independence of errors assumption is when the residuals in a regression are uncorrelated or independent. The residuals are the differences between the values the model predicts and the actual values from the data studied (Field, 2009). If these residual differences are too small, this could mean there is not enough independence that could increase the possibility of committing a Type 1 error (Tabachnick & Fidell, 2012). If it is determined that the residuals are too dependent, a Durbin-Watson statistical analysis can be performed (Field, 2009).

Sample size. The final assumption to be considered for both simple linear regression and MANOVA analyses was sample size. The sample size is significant because it relates to the generalizability of the results of the survey data (Pallant, 2010). NCI reported the total number of women, ages 18-34 for the 2008 and 2014 HINTS surveys (NCI, 2015). The number of women in each HINTS survey was determined to be of sufficient size to engender confidence in the current study's statistical analyses and to avoid a mistaken rejection of the null hypothesis, a Type 1 error (Creswell, 2009).

As stated above, in order to determine a minimum, sufficient sample size for this study, an *a priori* power analysis was conducted using the on line G*power program with an anticipated medium effect size of 0.15, a desired statistical power of level of 0.80, and a probability level of 0.05, and one as the number of the predictor variables. I determined that the result was a total minimum number of necessary and sufficient respondents was 100.

Main Analysis

The main statistical analyses for this secondary data was conducted using the IBM Statistical Product and Service Solutions (IBMSPSS) Package 21. The first research question was whether health self-efficacy predicted the use of sunscreen. The hypothesis was that there was no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS survey question number F2 and the use of sunscreen, as measured by the 2014 HINTS survey question H7. The answer to this first research question was determined using simple linear regression statistical analysis.

The second research question was whether health self-efficacy predicted the use of tanning beds or booths. The hypothesis was that there was no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS survey question number F2 and the use of tanning beds or booths, as measured by the 2014 HINTS survey question number H6. The answer to this research question was determined using simple linear regression statistical analysis.

The third and final research question was whether there was a mean difference between women's use of sunscreen and tanning beds and booths as indicated in the 2008 and 2014 HINTS research. The hypothesis was that there was no statistically significant difference in skin cancer protective behaviors by women in the 2008 HINTS research and female participants in the 2014 HINTS research, as measured by the 2008 HINTS survey questions numbered G1 and G2 and the 2014 HINTS survey questions numbered H7 and H6. The answer to this research question was determined using a MANOVA statistical analysis.

After the above-mentioned statistical analyses of simple linear regression and MANOVA, and because I examined subpopulations of the two HINTS survey data (women ages 18 to 34), I also used a statistical program WesVar 5.1, to add the jackknife replicate weights used in the original database (NCI, 2014). This is a statistical application that will decrease the possibility of a type 1 error, which is erroneously rejecting the null hypothesis (Pallant, 2010). These statistical analyses were chosen based upon the nature of the research questions and scales, which are interval. There was no need to consider potential covariates and/or confounding variables at this time (Field,

2009). The results were interpreted using the f test and corresponding p values (Field, 2009; Pallant, 2010). Table 1 below is a summation of the data analysis.

Table 1

Data Analysis Summary

RQ	IVs	IVs Level of Measurement	DVs	DVs Level Measurement	Statistical Analysis
RQ1	Health self-efficacy	Continuous	Sunscreen use	Continuous	Simple linear regression
RQ2	Health self-efficacy	Continuous	Tanning Device use	Continuous	Simple linear regression
RQ3	Females (level 1-2008; level 2- 2014)	Categorical	Sunscreen use	Continuous	MANOVA
		Continuous	Tanning Device use	Continuous	MANOVA

Note. RQ = research question; H = hypothesis; IV = independent variable; DV = dependent variable. Levels of measurement are categorical and continuous.

Validity and Reliability

NCI developed the HINTS survey questions by incorporating questions from other national surveys such as the CDC's Behavioral Risk Factor Surveillance System as well as from smaller, health-related surveys. NCI reviews each biennial HINTS survey and pretests for psychometrical soundness to ensure validity and reliability (Cantor et al., 2005). Each HINTS iteration has a percentage of questions that has been used in the past. For instance, in the 2005 questionnaire, at least 50% of the previous year's (2003 HINTS) questions were carried forward to maintain integrity and continuity and assess trends (Cantor et al., 2005). Specific statistical calculations regarding the reliability and validity of the 2008 and 2014 HINTS can be found at www.hintscancer.gov.

This study was a secondary data analysis of NCI's 2008 HINTS and 2014 HINTS survey data. Since 2003 when the HINTS surveys first began, there have been approximately seven major surveys; tens of thousands of U. S. adult citizens have been interviewed (Rutten et al., 2012). I have confidence regarding the reported validity of the 2008 and 2014 HINTS data because, as recited by Rutten et al. (2012) there have been consistent and rigorous attempts by the NCI to make each survey as valid as possible (see above discussion on Archival Research Methodology and Participants).

Threats to Validity

Validity refers to the idea that the HINTS surveys measure what they are purported to measure (Pallant, 2010). Threats to validity are to be avoided or minimized so that the study results are reliable (Creswell, 2014). The use of survey archival data in the current study means that internal validity threats such as testing, maturation, history

and instrumentation are not germane (Creswell, 2014). Notwithstanding, the issues such as sample size, the validity of the questionnaire, and the face validity of the questions remained significant. A threat regarding sample size is the possibility that the sample may be too small to make inferences to larger populations. I determined, having conducted an *a priori* statistical power analysis using the G*power statistical program, that the sample size for the current study was sufficient and reliable.

Additional threats to validity concern what is known as content validity – both face and sampling validity (Frankfort-Nachmias & Nachmias, 2008). Face validity refers to the appropriateness of the questionnaires used (Frankfort-Nachmias & Nachmias, 2008). Do the questions capture the phenomenon studied – in this case, the respondents perceptions of their self-efficacy about health care, and what they do regarding sunscreen use and indoor tanning device user? As stated above, the NCI has, since 2003, pre-tested and reviewed its surveys. It has consulted countless experts and outside agencies to perfect the questions over the years. While Frankfort-Nachmias and Nachmias (2008) state that there is no specific, final test to determine face validity, I determined that the lack of face validity was not a threat. Sampling validity, a type of content validity, concerns whether the questions represent the constructs intended to be measured; if there is no sampling validity, the questionnaire is deemed invalid (Frankfort-Nachmias & Nachmias, 2008). For example, theoretically many questions could be used to access the construct in the current study of a person's belief in health self-efficacy, the independent variable; however, to use all possible questions is impractical and in fact

only one question was used. I assumed that this question captured the essence of the concept of health self-efficacy.

Statistical conclusion validity can be threatened when the statistics upon which the data results and conclusions are based are not are not adequate in terms of power and statistical assumptions (Creswell, 2014). I resolved these threats by double-checking the assumptions for the pre- and post-analyses. Further, Cronbach alpha values was used to determine reliability and internal consistency of the scales.

Finally, another threat to the validity concerns external validity. External validity threats arise when results are erroneously extrapolated from the sample to others, which is when they are generalized to a greater population (Creswell, 2014; Frankfort-Nachmias & Nachmias, 2008). For instance, the results from the current study of women cannot be reasonably inferred to young adult men. To avoid this threat, I did not claim that the results can be generalized to any other population.

Threats to Reliability

Reliability refers to whether (a) there is internal consistency such that responses to constructs within the survey are consistent; (b) the survey results are consistent with prior surveys and the results consistent over time; and (c) there is consistency in interview administration and scoring (Creswell, 2010). As with the issue of validity, I depended upon the NCI's scrutiny of each iteration of the survey since 2003 to obtain the highest levels of reliability (see above discussion on Archival Research Methodology and Participants). An example of the NCI authors' attempts at establishing reliability,

between the 2003 and the 2005 survey, it made certain at least 50% of the questions were identical. Only trained interviewers were used to assure consistency of interview administration (Beckjord et al., 2007; Cantor et al., 2005). For internal consistency, Cronbach's coefficient alpha statistic was used to establish the average correlation of all the items that make up the scale. The resulting values can range from 0 to 1; the higher the value reported, the greater the reliability.

Ethical Research

Ethical rules and regulations are guides to ameliorate the possible harm researchers may perpetrate by violating the rights or welfare of participants (human or animal) while conducting a study (Frankfort-Nachmias & Nachmias, 2008). The rules and regulations address the researchers' obligations to their subjects including respecting their rights to confidentiality, informed consent, and the right to special consideration if a member of a vulnerable population, such as the elderly (Frankfort-Nachmias & Nachmias, 2008). There are several main ethical issues which must be addressed to avoid damage.

Confidentiality with regard to the respondents' personal information is crucial and in the current study, this was accomplished by the very first data analysts at NCI for the 2008 and 2014 HINTS by its giving each respondent a number (code) to represent him or her (Cantor, et al., 2005). It is only these codes to which I had access. Informed consent is another important ethical issue because the participant has a fundamental right to know what the study is about and be forewarned regarding what his or her participation entails (Frankfort-Nachmias & Nachmias, 2008). Because archival data was used, I was exempt

from the requirement to obtain informed consents from the respondents, according to the American Psychological Association (APA), ethical standard 8.05, part (b). The trained HINTS interviewers obtained the respondents' informed consents and advised them that they could discontinue their participation at any time (Cantor, et al., 2005).

Finally, the Institutional Review Board (IRB) of Walden University, which is the ethical oversight office, reviewed this study. I made an application to the IRB and it was approved prior to any data retrieval or analyses (IRB No. 09-22-17-0260191).

Summary

This was a quantitative research study using archival data from two national surveys conducted in 2008 and 2014 by the NCI entitled the Health Information National Survey (HINTS). I examined skin cancer protective behaviors of thousands of women, aged 18 to 34. The first two research questions concerned the relationship between the independent variable of health self-efficacy and the dependent variables of skin cancer protective behaviors, the use of sunscreen and the use of tanning beds and booths. These questions were based on the theoretical framework of health self-efficacy, which is a factor underlying people's achieving their health goals. The third research question examined the trends in women's sunscreen and indoor tanning device use over the six year period from 2008 to 2014. Chapter 4 presents the results of this study.

Chapter 4: Results

The first purpose of this quantitative study was to determine whether health self-efficacy predicted sunscreen use and tanning bed and booth use in U.S. women ages 18-34. Findings may be used to create skin cancer prevention educational programs. The second purpose was to assess possible trends in tanning behavior of women ages 18-34 between 2008 and 2014. Findings may add to the body of knowledge concerning women's use of sunscreen and tanning beds and booths and may lead to improved skin cancer prevention programs.

The three research questions and corresponding hypotheses were the following:

RQ1: Does health self-efficacy predict the use of sunscreen?

H_o1: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

H_a1: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

RQ2: Does health self-efficacy predict tanning behavior?

H_o2: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

H_a2: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

RQ3: Is there a difference between female participants in the 2008 HINTS 3 research and female participants in the 2014 HINTS 4, Cycle 4 research in skin cancer protective behaviors including the use of sunscreen and tanning behavior as measured by survey responses regarding their use of sunscreen and tanning behavior?

H_o3: There is no statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between female participants in the 2008 HINTS 3 research and female participants in the 2014 HINTS 4, Cycle 4 research, as measured by the 2008 HINTS 3, survey questions numbered G1 and G2 and the 2014 HINTS, Cycle 4 survey questions numbered H7 and H6.

H_a3: There is a statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between female participants in the 2008 HINTS 3 research and female participants in the 2014 HINTS 4, Cycle 4 research, as measured by the 2008 HINTS 3 survey questions numbered G1 and G2 and the 2014 HINTS 4, Cycle 4 survey questions numbered H7 and H6.

Chapter 4 includes an explanation of the secondary data collection methods, the statistical analyses, the descriptive statistics to describe the demographics for the 2008 and 2014 HINTS data, the frequencies and percentages of 2008 and 2014 sunscreen use

and tanning bed and booth use, the assumptions, and the results of the statistical analyses for the three research questions.

Several changes to the proposed data collection and analysis were made. First, it was necessary to use the SAS statistical program instead of the IBM Statistical Product and Service Solutions (SPSS). Unlike SPSS, SAS has the capability to analyze the jackknife replicate weighting results that must be used to compute HINTS (complex sampling design) data; jackknife replicate weighting means the results can be generalized to all adults throughout the United States (HINTS, 2017; Moser, 2016; R. Moser, personal communication, March 20, 2018). Second, for the three research questions, logistic regression analyses rather than simple linear regression and MANOVA analyses were used because the variables were ordinal (see Pallant, 2010). In the proposal, I used the term *trends* when referencing the third research question. I later determined that the more accurate term was *changes* when comparing in the HINTS data between 2008 and 2014 (vcefurthermaths, 2018). Finally, modes for the descriptive statistics were not calculated. Instead frequencies and percentages were reported.

Results of the HINTS surveys for 2008 and 2014 were used for this study. HINTS are biennial national surveys that have been conducted in the United States since 2003. These surveys focus on people's cancer knowledge and treatments and how they access information about cancer treatments and prevention. The HINTS have a complex survey design that includes a jackknife replicate weighting application that makes generalization of the results to the entire U.S. population of young adult women possible (R. Moser, personal communication, March 30, 2018). This generalization assumption was

applicable to all findings in this study except when data were noted as unweighted. The data are available to the public online at the National Cancer Institute website.

Data Collection

For the 2008 HINTS survey, people across the United States were contacted by telephone and mail to respond to a questionnaire. After Westat, the company affiliated with the National Cancer Institute and HINTS for creating, processing, and analyzing HINTS questionnaires, deleted partially completed interviews and those otherwise considered unusable, there remained a total of 7,674 responses (HINTS, 2017). Although the response rates for the telephone interviews and the mailed interviews were different (24.23% and 30.99%, respectively), the difference in responses by survey mode was not sufficient to warrant use of the results of one mode over the other. Westat combined the results to collect a total of 7,674 responses (HINTS, 2017; Valle et al., 2016). Out of the 7,674 responses in the 2008 HINTS survey, there were 731 female respondents ages 18-34 years. This sample was determined to be a sufficient sample size for this study.

For the 2014 HINTS, after missing, incomplete, and unusable interviews were deleted by Westat, the responses of 3,677 U.S. adults ages 18-65+ were included in the study (HINTS, 2017). The response rate was 34.44%. The total number of women ages 18-34 years was 323, which was a sufficient sample size for this study.

Westat originally removed questionnaires that were unusable and therefore could not be included in the final count (HINTS, 2017). I further screened the 1,054 women's responses (731 for 2008 and 323 for 2014) to assess any missing data germane to the three research questions. Generally, missing data can be corrected by imputing data.

Imputation is a complicated statistical correction process sometimes used for large and complex surveys of this type, however it was not used in this study because the SAS statistical program used for the main analyses herein cannot accurately compute the imputations (HINTS, 2017; R. Moser, personal communication, February 1, 2018). Notwithstanding, I determined that the missingness in the samples for the 2008 and 2014 HINTS was at an acceptable level and did not have a detrimental effect in these analyses because relative to the theoretical complete response data of all respondents (100%), the available data I used had only between 1% and 5% of the data missing, see Tables 2, 3, and 4 (K. Ghebrehawariat, personal communication, April 11, 2018; see Pallant, 2010).

Table 2

RQ1. Sunscreen Use and Health Self-Efficacy Missing Data Patterns, 2014

					Group Means	
Group	Sunscreen	HSE	Freq	%	Sunscreen	HSE
1	X	X	307	95.05	3.1661254	2.026059
2	X	.	4	1.24	4.2500000	.
3	.	X	12	3.72	.	1.833333

Note. HSE = health self-efficacy. Freq = frequency.

Table 3

RQ2. Tanning Device Use and Health Self-efficacy Missing Data Patterns, 2014

					Group Means	
Group	Tanning	HSE	Freq	%	Tanning	HSE
1	X	X	307	98.71	0.192182	2.026059
2	X	.	4	1.29	0	.

Note. HSE = health self-efficacy. Freq = frequency.

Table 4

RQ3. Sunscreen Use and Tanning Device Use Missing Data Patterns, 2008 and 2014

					Group Means	
Group	Sunscreen	Tanning	Freq	%	Sunscreen	Tanning
1	X	X	1012	96.02	3.036561	3.725300
2	X	.	6	0.57	3.000000	.
3	.	X	14	1.33	.	0.285714
4	0	0	22	2.09	.	.

Note. Freq = frequency. X = variable observed in corresponding group; "." or "0" = variable not observed in corresponding group.

I decided to eliminate the last possible response choice to the sunscreen usage question for research questions 1 and 3 because I was interested only in the frequency of sunscreen use; the last possible choice was, "does not go out on a sunny day". Thus the remaining choices were always, often, sometimes, rarely, or never.

I collapsed the response choices to the question regarding the use of tanning beds and booths because there was a quasi-complete separation of data points, which is the result of too many respondents not choosing any of the possible response choices

(missing cells), Table 5 (see Field, 2009; Introduction to SAS, 2018). The question asked the respondent to indicate the number of times the respondent used a tanning bed or booth within the past year by choosing one of five choices: zero, 1-2 times, 3-10 times, 11-24 times, and 25 times or more. The zero level was retained and the remaining four were collapsed so that the final analysis was based on two instead of five levels, zero being one group and the other being those who responded they used indoor tanning devices from one time to 25 or more times.

Table 5

Missing Data Patterns, Tanning Bed and Booth Use and Health Self-Efficacy

Tanning Bed Use and Health Self-Efficacy

Tanning Bed	Health Self-efficacy	Frequency	Weighted Frequency	Std Error of Wgt Freq	%	Std. Err of %
O times	Completely confident	82	9965138	1257367	29.3668	3.6701
	Very confident	133	12022011	146726	35.4283	4.2356
	Somewhat confident	58	6234123	1113435	18.3716	3.2471
	A little confident	11	870744	354002	2.5660	1.0468
	Not confident at all	2	76394	56545	0.2251	0.1674
Total		286	29168410	1358016	85.9578	3.5613
1 to 2 times	Completely confident	4	833838	499199	2.4573	1.4737
	Very confident	7	1149493	816573	3.3875	2.4057
	Somewhat confident	6	1014672	703562	2.9902	2.0721
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	17	2998003	1088481	8.8350	3.1953
3 to 10 times	Completely confident	1	82455	83510	0.2430	0.2463
	Very confident	4	355018	227600	1.0462	0.6734
	Somewhat confident	3	434256	249264	1.2797	0.7369
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	8	871729	406243	2.5689	1.2111
11 to 24 times	Completely confident	2	295369	139711	0.5757	0.4112
	Very confident	0	-	-	-	-
	Somewhat confident	0	-	-	-	-
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	2	195369	139711	0.5757	0.4112
25 or more times	Completely confident	1	107452	109114	0.3167	0.3216
	Very confident	4	574197	360814	1.6921	1.0624
	Somewhat confident	1	18230	18845	0.0537	0.0555
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	6	11184252	1304782	32.9594	3.8385

Note. Std Err of Wgt Freq = Standard Error of Weighted Frequency. Std Err of % = Standard Error of %.

Finally, the question regarding the variable health self-efficacy for the first two research questions originally had five response choices: completely confident, very confident, somewhat confident, a little confident, and not confident at all. The last three response choices were collapsed because there was a quasi-complete separation of data points, Tables 5 and 6 (see Field, 2009; Introduction to SAS, 2018). The three remaining responses used for the final analyses were: completely confident, very confident, and somewhat confident or less.

Table 6

Missing Data Patterns, Sunscreen Use and Health Self-Efficacy

Sunscreen Use by Health Self-Efficacy						
Sunscreen Use	Health Self-efficacy	Frequency	Weighted Frequency	Std Error of Wgt Freq	%	Std. Err of %
		82	9965138	1257367	29.3668	3.6701
	Very confident	133	12022011	146726	35.4283	4.2356
	Somewhat confident	58	6234123	1113435	18.3716	3.2471
	A little confident	11	870744	354002	2.5660	1.0468
	Not confident at all	2	76394	56545	0.2251	0.1674
	Total	286	29168410	1358016	85.9578	3.5613
1 to 2 times	Completely confident	4	833838	499199	2.4573	1.4737
	Very confident	7	1149493	816573	3.3875	2.4057
	Somewhat confident	6	1014672	703562	2.9902	2.0721
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	17	2998003	1088481	8.8350	3.1953
3 to 10 times	Completely confident	1	82455	83510	0.2430	0.2463
	Very confident	4	355018	227600	1.0462	0.6734
	Somewhat confident	3	434256	249264	1.2797	0.7369
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	8	871729	406243	2.5689	1.2111
11 to 24 times	Completely confident	2	295369	139711	0.5757	0.4112
	Very confident	0	-	-	-	-
	Somewhat confident	0	-	-	-	-
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	2	195369	139711	0.5757	0.4112
25 or more times	Completely confident	1	107452	109114	0.3167	0.3216
	Very confident	4	574197	360814	1.6921	1.0624
	Somewhat confident	1	18230	18845	0.0537	0.0555
	A little confident	0	-	-	-	-
	Not confident at all	0	-	-	-	-
	Total	6	11184252	1304782	32.9594	3.8385

Note. Std Err of Wgt Freq = Standard Error of Weighted Frequency. Std Err of % = Standard Error of %.

Results

Descriptive Statistics

Table 7 details the frequencies and percentages (unweighted) for both 2008 and 2014 for Education, Income, and Race/Ethnicity. Highlights from the 2008 data include that a small majority the women had some college, had graduated from college, or had postgraduate experience (57.6%). The most women, 208 (36%) stated that they had attained at least some college level education. A majority was Non-Hispanic White (57.3%); Black or African American and Hispanic women comprised a total of 29.8%. 42.7 % of the women resided in households that represented the sample's income middle third, earning between $20,000 and $74,999. The single greatest number of women, 111, reported living in households with an income between $50,000 and $74,999 (14.4%).

While the percentages for 2014 were generally similar, overall, to those of 2008, there were some differences. It is noted that with regard to frequencies, there were less than half as many female respondents aged 18 to 34 years in 2014 than in 2008, 731 as compared to 323. In 2014, the women were more educated: 75.1% reported having had some college, were college graduates, or had postgraduate education, indicating a 17.5% increase in six years. Only 3.5% of the women had not graduated from high school as compared to 8.4% in 2008. The race/ethnicity diversity of the cohort is slightly more in 2014 than in 2008: in 2008 37.2% of the respondent women were of various race/ethnicities while 57.3% were Non-Hispanic White; in 2014 the percentages were 41.26% and 56.1% respectively. The 2014 percentages for household income are generally similar to those of 2008: 48.4% of the women reported that their household

income was between $20,000 and $74,999, which was in the middle third of the range between $0 and $200,000 or more.

Table 7

Frequencies and Percentages for Participants' Demographic Characteristics

Demographic	2008 Survey		2014 Survey	
	n	%	*n*	%
Education				
Less than 8 years	18	0.4	1	.4
8 through 11 years	48	1.3	11	3.5
12 years or completed high school	125	3.5	43	0
Post – high school (other than college)	28	4.9	20	6.3
Some college	208	36.0	80	29.4
College graduate	194	15.0	106	9.8
Postgraduate	79	6.6	60	15.9
Missing	31	4.3	2	.6
	731	100.0	323	100.0
Race/Ethnicity				
Hispanic	112	16.6	60	15.6
Non-Hispanic White	422	57.3	177	56.1
Non-Hispanic Black or African American	92	13.2	46	15.2
Other	66	7.4	35	10.4
Missing	39	5.5	5	2.6
	731	100.0	323	100.0
Income				
$0 – 9,999	50	9.5	30	8.8
$10,000 - 14,999	57	9.0	30	9.0
$15,000 - 19,999	42	4.8	17	8.1
$20,000 - 34,999	107	14.3	52	17.9
$35,999 - 49,999	92	14.0	49	11.2
$50,000 - 74,999	111	14.4	68	19.3
$75,000 - 99,999	88	10.1	30	9.7
$100,000 - 199,999	91	9.9	34	11.7
$200,000 or more	10	.9	2	.4
Missing	83	13	11	4.1
	731	100.0	323	100.0

The frequencies and percentages of sunscreen use and indoor tanning device use were examined (Tables 8 and 9). The percentage of females who used sunscreen always, often, and rarely decreased from 2008 to 2014. There was an increase in the percentage of females who did not use sunscreen at all from 2008 to 2014 (18%, 24%). Fewer females used tanning beds and booths at all in 2014 than in 2008 (90% vs. 80%) and fewer females reported using tanning beds and booths from one to 25 times or less. Note that the weighted values are a result of Westat's computing jackknife replicate weights to be able to generalize the results of the HINTS' surveys to all U. S. women ages 18-34; unweighted results refer to the actual numbers of females, 18-34 years of age, a total of 1036 females.

Table 8

Frequencies and Percentages of Sunscreen Use, 2008 and 2014

Sunscreen Use by Year

	Always		Often		Sometimes		Rarely		Never	
Year	*n**	%	*n*	%	*n*	%	*n*	%	*n*	%
2008	118	17	162	22	173	24	129	18	125	19
2014	38	12	67	21	80	26	53	17	73	24

* Unweighted values; total number for 2008, 703; total number for 2014, 323.

Table 9

Frequencies and Percentages of Tanning Bed and Booth Use, 2008 and 2014

Tanning Bed and Booth Use by Year

Year	None		1-25 times or more	
	*n**	%	*n*	%
2008	567	80	136	20
2014	290	90	33	10

* Unweighted values; total number for 2008, 703; total number for 2014, 323.

Assumption Testing

There were several assumptions that needed to be assessed and rectified if violated. Outliers are those responses that are inconsistent with most of the responses, those with out-of-range values that could skew the results so that Type I and Type II errors are more likely to be made (Pallant, 2010; Tabachnick & Fidell, 2012). I screened the data to determine if there were unusual discrepancies in the responses, including a large portion of the participants not answering a particular question or whether one answer was consistently chosen. It was evident that there were no discrepancies in the responses and therefore no outliers needed to be rectified.

Another initial issue that arose was whether the statistical model chosen, ordinal logistic regression, was the best (also known as goodness-of-fit) for the purposes of determining inferences among the variables in the first two research questions (Field, 2009; Newsom, 2015). For research question 1, to examine whether health self-efficacy

predicted the use of sunscreen, when the SAS ordinal logistic regression was first conducted, I found that the proportional odds assumption was not met due to the relatively small sample size (Institute for Digital Research and Education, 2018). This led to test a different model, a multinomial logistic regression, and the comparison of the Akaike information criterion (AIC) generated by both regression models (Fakherpour, Ghaem, Fattahi, & Zaree, 2018). The AIC criterion numbers are an indication of the degree of model fitness. The multinomial logistic regression model had a lesser AIC so this model was the better fit for the data regarding sunscreen use and was therefore used for both sunscreen questions for research questions 1 and 3 (model fit statistics: the ordinal logistic regression AIC is 99208622 and the multinomial logistic regression AIC is 96780985 [Field, 2009]). For research questions 2 and 3 regarding tanning behavior, having collapsed the tanning bed and booth use responses from five to two (see above), I determined that a logistic regression analysis was the best statistical model to use (Field, 2009). Table 10 represents an overall measure of the statistical models' best fit (Newsom, 2015). These statistical results confirmed the use of the logistic regressions detailed above and will be more fully examined for each research question below.

Table 10

Global Tests Table (Likelihood Ratios), RQ1, RQ2, RQ3

Global Tests

Test	Likelihood Ratio			
	F Value	Num DF	Den DF	Pr>F
RQ1. HSE and sunscreen use	3.49	6.20	304.02	0.00
RQ2. HSE and tanning behavior	.64	1.83	89.52	.52
RQ3. Sunscreen use 2008 and 2014	2.23	3.38	165.71	0.07
RQ3. Tanning behavior 2008 and 2014	10.88	1.00	49.00	0.09

Note. HSE = health self-efficacy.

Remaining assumptions for both logistic regression and multinomial logistic regression analyses that required examination were: (a) the assumption that there be a linear relationship between the independent variables and the dependent variables is implicit when using categorical variables and non-parametric statistical analyses (Laerd, 2018); (b) the assumption of independence of observations was not violated because each female respondent had no contact with any other respondent (Laerd, 2018; Pallant, 2010); (c) multicollinearity, which is when two or more of the independent variables are highly related to each other, was not violated because there was only one independent variable for each research question (Laerd, 2018; Pallant, 2010); and (d) the dependent variable is

measured at the ordinal level and the independent variable is considered continuous (Laerd, 2018; Pallant, 2010).

Main Analysis

Research Question 1

Does health self-efficacy predict the use of sunscreen?

H_o1: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

H_a1: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of sunscreen, as measured by the 2014 HINTS 4, Cycle 4 survey question number H7.

I conducted a multinomial logistic regression statistical analysis to determine whether beliefs of health self-efficacy were predictive of the likelihood of sunscreen use. Health self-efficacy was the independent variable and sunscreen use was the dependent variable. The Likelihood Ratio statistics in Table 10 indicated that there is a statistically significant association between health self-efficacy and sunscreen use, F (6.2, 304.02) = 3.49, p <0.01 (Field, 2009). As detailed in Table 11 only one level of the independent variable, completely confident, made a statistically significant impact on sunscreen use with an odds ratio of .23. Because the odds ratio is less than 1, the results mean that females with high self-efficacy scores were .23 times less likely to report they used sunscreen rarely compared to those who were somewhat or less confident with their health self-efficacy. In other words, it is more likely that a female who categorizes herself

as being somewhat or less confident in health self-efficacy would indicate that she rarely used sunscreen as compared to one who was completely confident in her health self-efficacy (see Laerd Statistics, 2018; see Pallant, 2010).

Table 11

RQ1: Multinomial Logistic Regression; Health self-Efficacy and Sunscreen Use, 2014

		Sunscreen Use											
	Never	Always			Often			Sometimes			Rarely		
	Ref	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Health Self-efficacy													
Somewhat confident or less	-	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Very confident	-	.96	[.20, 4.69]	.36	.40	[.10, 1.72]	.23	1.10	[.30, 4.07]	.95	1.26	[.26, 6.17]	.12
Completely confident	-	3.08	[.47, 20.4]	.16	.73	[.18, 3.04]	.81	1.14	[.32, 4.11]	.86	.23	[.04, 1.23]	.02

Note. Ref = Reference categories: somewhat confident or less health self-efficacy; sunscreen use = never. OR = odds ratio. CI = Confidence interval; $p < 0.05$.

Research Question 2

Does health self-efficacy predict tanning behavior?

H_o2: There is no statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

H_a2: There is a statistically significant relationship between health self-efficacy, as measured by the 2014 HINTS 4, Cycle 4 survey question number F2 and the use of tanning beds or booths, as measured by the 2014 HINTS 4, Cycle 4 survey question number H6.

I conducted a logistic regression statistical analysis to assess whether the independent variable of health self-efficacy predicted the categorical dependent variable of the use of tanning beds and booths. Table 10 (Likelihood Ratio) indicated that there is no statistically significant association between health self-efficacy and tanning behavior, $F(1.82, 89.52) = 64$, $p > 0.05$. Table 12 details the results of the analysis and indicated that health self-efficacy does not predict the use of tanning beds and booths.

Table 12

RQ2: Logistic Regression; Health Self-Efficacy and Tanning Bed and Booth Use, 2014

	Tanning Bed and Booth Use			
	None	1-25 times or more		
Variable	Ref	OR	95% CI	*p*
Health Self-efficacy				
Somewhat confident or less	Ref	Ref	Ref	Ref
Very confident	-	1.18	[.28, 4.97]	.87
Completely confident	-	1.67	[.30, 9.28]	.54

Note. Ref = Reference categories: somewhat confident or less health self-efficacy; tanning bed and booth use = none. OR = odds ratio. CI = Confidence interval. $p < 0.05$.

Research Question 3

Is there a difference between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey regarding skin cancer protective behaviors including the use of sunscreen and tanning behavior as measured by survey responses regarding their use of sunscreen and tanning behavior?

H_o3: There is no statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey, as measured by the 2008 HINTS 3 survey questions G1 and G2 and the 2014 HINTS, Cycle 4 survey questions H7 and H6.

H_a3: There is a statistically significant difference in skin cancer protective behaviors of the use of sunscreen and tanning bed or booth use between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey, as measured by the 2008 HINTS 3 survey questions G1 and G2 and the 2014 HINTS 4, Cycle 4 survey questions H7 and H6.

As stated above, it was determined that multinomial logistic regression and logistic regression analyses were the best fit models to predict the changes in sunscreen use and tanning bed and booth use between 2008 and 2014 (see Pallant, 2010). A multinomial logistic regression was conducted to examine how well the predictor (independent) variables of the years 2008 and 2014, predicted the categorical dependent variable of sunscreen use. Table 10 (Likelihood Ratio) indicated that there is no statistically significant change in the use of sunscreen in 2008 and 2014, F(3.38, 165.71)

= 2.23, $p < 0.05$. Table 13 shows the details of the multinomial regression analysis that I conducted to examine whether there was a statistically significant change in the use of sunscreen between the years of 2008 and 2014. There was no statistically significant difference in sunscreen use by year.

Table 13

RQ3. Multinomial Logistic Regression; Sunscreen Use 2008 and 2014

Sunscreen Use

	Never	Always			Often			Sometimes			Rarely		
	Ref	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Year													
2008	-	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
2014	-	.60	[.23, 1.46]	.24	1.06	[.54, 2.08]	.09	1.06	[.60, 1.7]	.98	.75	[.43, 1.33]	.32

Note. Ref = Reference categories: year = 2008; sunscreen use = never. OR = odds ratio. CI =Confidence interval. $p < 0.05$.

I conducted a logistic regression to examine how well the independent) variables, the years 2008 and 2014, predicted the categorical dependent variable of tanning bed and booth use. Table 10 provided the details for the Likelihood Ratio, F (1.00, 49.00) = 10.88, $p < 0.05$ and evinced the lack of a statistically significant difference in indoor tanning device use in the two years. Table 14 shows the results of the logistic regression that I conducted to assess whether there was a statistically significant change in the use of

tanning beds and booths between the years 2008 and 2014. There was no statistically significant difference in the use of tanning beds and booths by year.

Table 14

RQ3. Logistic Regression; Tanning Bed and Booth Use 2008 and 2014

	Tanning Bed and Booth Use			
	None	1-25 times or more		
	Ref	OR	95% CI	*p*
Year				
2008	-	Ref	Ref	Ref
2014	-	0.57	[0.29,1.10]	0.09

Note. Ref = Reference categories: year = 2008; tanning bed and booth use = none. OR = odds ratio. CI = Confidence interval. $p < 0.05$.

Summary

The results of the statistical analysis of the multinomial logistic regression for the first research question indicated that high levels of the predictor variable health self-efficacy predicted the categorical dependent variable of sunscreen use among women aged 18-34 years of age. The results for research question 2 indicated that the predictor variable of health self-efficacy did not predict the dependent variable of the use of tanning beds and booths. Further, the results of the statistical analyses I conducted for the third research question revealed that there was no statistically significant difference in the proportion of females who used sunscreen in 2008 compared to 2014 and there was no significant difference in the proportion of females who used tanning beds and booths in 2008 compared to 2014. Finally, for the actual females in this study (703 in 2008 and 323

in 2014), the percentage usage of sunscreens generally decreased between 2008 and 2014. The tanning bed and booth use frequencies and percentages indicated that generally the females in this study used indoor tanning devices more in 2014 than during 2008. In Chapter 5, I discuss the above results, draw conclusions, and summarize the potential use of the results for future research and from a practical point of view.

Chapter 5: Discussion, Conclusions, and Recommendations

Approximately 90% of skin cancer cases can be prevented through limiting exposure to UV radiation (Diao & Lee, 20 14; Tripp et al., 2016). Excessive exposure to UV radiation can be avoided by wearing sunscreen and avoiding tanning beds and booths, which are known to cause cancer; however, people frequently do not use sunscreen and patronize indoor tanning device salons (American Cancer Society, 2016e). With the incidence of skin cancer on the rise in the United States, it is important to understand the motivations affecting people's attitudes and behaviors regarding the use of sunscreen and avoidance of tanning beds and booths.

The purpose of the first two research questions was to examine the predictive relationship between health self-efficacy and skin protective behaviors among U.S. women ages 18-34. More specifically, I examined whether women's health self-efficacy predicted their use of sunscreen and avoidance of tanning beds and booths, both of which are commonly known as skin protective behaviors. The third research question addressed the changes in sunscreen use and tanning bed and booth use among women ages 18-34 years between 2008 and 2014. Findings may be used to develop medical and educational skin cancer prevention interventions. If findings indicated that sunscreen use had significantly increased between 2008 and 2014, this result would be an incentive to explore why the incidence of skin cancer continues to escalate.

At the time of the study, there were no known studies that addressed these variables with weighted results representing U.S. women ages 18-34. Findings may be used to develop medical and educational skin cancer prevention interventions. If findings

indicated that sunscreen use had significantly increased between 2008 and 2014, these results would be an incentive to explore why the incidence of skin cancer continues to escalate.

At the time of this study, there were no known studies that addressed these variables with weighted results representing U. S. women ages 18-34. The results may lead to better skin cancer preventive interventions including the promotion of sunscreen use and the dissemination of information regarding the carcinogenic nature of tanning beds and booths.

Secondary data were collected from the HINTS surveys for the years 2008 and 2014. Although each HINTS survey included thousands of randomly chosen U.S. adults, the focus of this study was women respondents between the ages of 18 and 34 because they are at a proportionately higher risk for developing skin cancer. Because the 2008 and 2014 HINTS surveys have a complex survey design, the current study's weighted results can be generalized to all U.S. women in the specified age group. The SAS statistical program was used for the data analyses to answer the three research questions:

RQ1: Does health self-efficacy predict the use of sunscreen?

RQ2: Does health self-efficacy predict tanning behavior?

RQ3: Is there a difference between women participants in the 2008 HINTS 3 survey and women participants in the 2014 HINTS 4, Cycle 4 survey regarding skin cancer protective behaviors including the use of sunscreen and tanning behavior as measured by survey responses regarding their use of sunscreen and tanning behavior?

The results of the statistical analyses indicated that high scores on health self-efficacy were a significant predictor of sunscreen use, but health self-efficacy was not a predictor of indoor tanning device use. Regarding the third research question, changes in sunscreen use and tanning behavior between 2008 and 2014 were not statistically significant. The findings also revealed that a greater percentage of the women surveyed used sunscreen less in 2014 than in 2008 and used tanning beds and booths more in 2014 than in 2008. In Chapter 5, I interpret these results and describe the limitations of the study. I also address implications for social change and recommendations for future research.

Interpretation of the Findings

Health Self-Efficacy as a Predictor of Skin Protective Behavior

The purpose of the first research question was to determine whether women's health self-efficacy predicted their use of sunscreen to protect against skin cancer. The health self-efficacy survey question asked the women to rate their ability to take good care of their health. The response choices ranged from completely confident to somewhat confident or less. The sunscreen question asked respondents to state how often they used sunscreen and the response choices ranged from always to never.

The results indicated that health self-efficacy (people's belief in their ability to control their health and achieve health goals [Conner & Norman, 2005]) predicted sunscreen use: women who stated they were completely confident about their health self-efficacy were less likely to have rarely used sunscreen compared to those who felt somewhat or less confident about their health self-efficacy. The more confidence women

had in their health self-efficacy, the more likely they were to use sunscreen. These results suggest that health self-efficacy should be considered when creating skin cancer preventive interventions.

The results were consistent with those from previous studies. Health self-efficacy has been determined to be predictive of healthy behaviors generally (Anderson-Bill, Winett, & Wojcik, 2011). Several studies indicated a significant relationship between health-self efficacy and people's sunscreen use. However, these studies were limited by their homogeneous samples and the findings were not generalizable to U.S. women ages 18-34. Kamimura et al. (2015), using HINTS survey data, found that self-efficacy predicted positive skin cancer protective behaviors of the 551 low-income, uninsured patients in a primary care clinic. He (2014), who also used HINTS data, found that people with high self-efficacy were more likely to use sunscreen. Pertl et al. (2010) studied 590 women and determined that those who had a higher sense of self-efficacy were more likely to have the intention to use sunscreen. Finally, Nahar et al. (2013) studied North Mississippi landscape workers and found that their beliefs of self-efficacy predicted their sun protective behaviors.

The second research question was designed to determine whether health self-efficacy predicted indoor tanning device use. The HINTS tanning bed and booth question asked women to explain how often they had used tanning beds and booths in the past year, and the choices ranged from 0 to 25 or more times. The assumption was that a woman's infrequent or nonuse of indoor tanning devices could be interpreted as skin cancer protective behavior; frequent use would signify skin cancer risk behavior. The

results indicated that health self-efficacy did not predict women's use of tanning beds and booths with any statistical significance. Health self-efficacy did not appear to play a significant role in the frequency with which women used or did not use indoor tanning devices. These results are consistent with other studies such as the one by Pertl et al. (2010) and Noar et al. (2014). Pertl et al. found that the influence of self-efficacy and controllability was not related to tanning bed and booth use. Noar et al. attempted to understand why females used indoor tanning devices. They surveyed 706 university women ages 18-25 and determined that the reasons for their using tanning beds and booths were their concepts of appearance, mood enhancement, convenience, and health improvement – concepts that perhaps indicate self-doubt rather than strong beliefs of health self-efficacy. Noar et al.'s findings support the results of this study: there was no t relationship between health self-efficacy and tanning bed and booth use.

The theory of health self-efficacy is an attempt to explain people's attitudes and behaviors regarding how they take care of their health (Conner & Norman, 2005). Self-efficacy is the belief in one's ability to conceptualize and achieve a specific goal; health self-efficacy pertains to one's belief that he/she can achieve a particular health goal, for example stop smoking cigarettes within six months (Bandura, 1997; Conner & Norman, 2005). People have disparate levels of health self-efficacy. It has been postulated that a person's level of health self-efficacy may predict his or her success in self-care: high levels of health self-efficacy mean greater success in reaching a health goal (Luszcynska & Schwarzer, 2005).

The overall findings of this study with regard to sunscreen use reinforce the correctness of the health self-efficacy theory. The women who felt confident in their ability to care for their health were those who used sunscreen. Regarding indoor tanning device use, the results did not evince any correlation between tanning bed and booth use and women's health self-efficacy. These results may be considered to not repudiate the health self-efficacy theory so much as reinforce the idea that women, ages 18-34 years, do not fully appreciate the skin cancer risks indoor tanning devices pose and therefore do not relate their use or non-use to taking care of their health (Coups, Geller, & Pagoto, 2016; Pertl et al., 2010; Noar et al., 2014).

2008 and 2014 Sunscreen and Tanning Bed and Booth Use

The first part of research question 3 examined whether there was a difference in sunscreen use between the years 2008 and 2014. The same sunscreen question was used as in research question 1. The results indicated that there was no statistically significant difference in the use of sunscreen between these two years. To some extent, I had anticipated that the results would indicate the opposite, that sunscreen was used more frequently in 2014. I thought this because of an assumption regarding the increase in the publics' knowledge about skin cancer prevention due in no small part to manufacturers' proliferate promotional efforts of an ever increasing variety of sunscreens through various media as well as the medical community's increased knowledge about skin cancer causes and prevention (Centers for Disease Control and Prevention, 2016b). These results can be interpreted as meaning that despite rigorous efforts to sell sunscreen as being essential to avoid skin cancer, women 18-34 years of age might still not be getting

the message that skin cancer is a very real hazard and protection is imperative. Further, the findings were consistent with the (unweighted) percentages of sunscreen use found in this study (Chapter 4, Table 3): generally, sunscreen was used less in 2014 than in 2008. No interpretations regarding trends with the results of just two years being compared. The possible barriers (and motivating factors such as health self-efficacy) to using sunscreen must be explored in future research as part of an effort to minimize the incidence of skin cancer. For instance, an uncommon theory that has been postulated was that a decline in sunscreen use over the years could indicate that people perhaps believe they are genetically predisposed to get skin cancer and therefore feel it is useless to try to prevent it. This could be happening especially because of all the current information and misinformation about cancer on the internet (Dar-Nimrod, Cheung, Ruby, & Heine, 2014; Waters, Muff, & Hamilton, 2014).

The purpose of the second part of research question 3 was to examine the change, if any, in the use of tanning beds and booths in the years 2008 and 2014. Again, non-use of indoor tanning devices was considered in this study to be a skin protective behavior. The results indicated that there was no significant difference in the use of tanning beds and booths between the two years. It was expected that tanning bed and booth use would have declined based on the assumptions that a greater number of women would have learned about (a) the dangers of skin cancer generally, and (b) the fact that tanning beds and booths cause skin cancer (Centers for Disease Control and Prevention, 2016c). These results are not consistent with the (unweighted) percentages of tanning bed and booth use found in this study: the percentage results indicate that in 2014 as compared to 2008 more

women reported they did not use indoor tanning devices at all or used them less frequently. Nevertheless, like sunscreen use as described above, the results beg the question as to why there is not a larger change in women's behavior, especially when it is clear tanning beds and booths are carcinogenic.

Limitations

Several limitations of this study, which are a function of using the HINTS survey data, are important to recognize: a limited number of respondents, self-reporting of respondents, the use of a cross-sectional design, and the constraints regarding the use of the data from the years 2008 and 2014. Generally, while the actual number of women surveyed could be considered a limitation, because the HINTS data in this study was weighted the results can be generalized to the thousands of women 18-34 years of age in the United States. Self-reporting is always suspicious to a degree because it is understood that respondents' answers may not be entirely genuine due to what is known as social desirability bias. A cross-sectional design does not provide the opportunity to compare specific individuals and their changes in attitudes and behaviors across time. The use of the HINTS data for the years 2008 and 2014 was necessary, though it limited the data comparisons to six years. These years were chosen because these survey iterations had identical questions regarding health self-efficacy and the use of sunscreen and tanning beds, a requirement for comparisons.

There are limitations regarding the questionnaires themselves: I was bound by the one, imprecise question regarding health self-efficacy and no questions were asked about the respondents' feelings regarding sunscreen or tanning beds and booths. It is important

to note that the predictive nature of health self-efficacy on both sunscreen use and indoor tanning device use was analyzed without consideration for other variables that may influence behaviors (see Pallant, 2010). Other studies referenced herein considered disparate covariates, for instance the research conducted by Heckmen et al. (2012) wherein women's attitudes and behaviors regarding skin cancer were related to self-reports about the color of their skin. While additional variables can be informative they can also confound. Thus the reason for limiting this study in terms of covariates or mediating variables was an attempt to get a clearer picture, a baseline concept of the effect of health self-efficacy from which further studies could proceed.

Recommendations

Based upon the findings of this study, several possible studies are suggested for future research. It was determined in this study and in previous studies that high beliefs of health self-efficacy are associated with the use of sunscreen. Besides the need to replicate this study to confirm the findings, it would be important to examine more definitively what health self-efficacy means as it relates to skin cancer preventive behaviors because it appears counter-intuitive that sunscreen is not used more. As stated above, a limitation of this study was the single question in the HINTS 2014 questionnaire that asked about self-care generally. A future study could be qualitative and allow women to expand upon their beliefs of health self-efficacy and how these beliefs are related to their use of sunscreen. For instance, three questions could be, " What does health self-efficacy mean to you?", "Do you think your belief in health self-efficacy means using sunscreen?" and, "Does your belief in health self-efficacy include getting sunburned or tan?"

Health self-efficacy was not associated with the use of tanning beds and booths. It would have been encouraging to have found that positive health self-efficacy predicted little or no indoor tanning device use because their use is likely to lead to skin cancer. It may very well be that people do not understand how risky it is to use indoor tanning devices and therefore do not relate their use to skin cancer or healthy behavior. A good starting point may be a study that examines what people actually know about tanning beds and booths.

The current study indicated that sunscreen was used proportionately less by female respondents in 2014 than in 2008. Also, when the weighted data was considered, there was no significant difference in sunscreen use between the two years. Future research should include attempts at replicating this study to confirm these results especially since it seems imperative to try to get people to use sunscreen, which is considered a critical part in the fight against skin cancer. Future research should also examine more current data extending over a greater period of time, for instance from 2008 to 2017, and which included enough information to track trends in skin protective behaviors.

There was no statistically significant difference with the weighted data in the use of tanning beds and booths between the years 2008 and 2014. However, the percentage frequencies of the females in this study showed a slight decrease in their use over the same time period. Future studies would be helpful to determine whether there may be a trend toward non-use and why it may be occurring. If, on the other hand, a trend toward increased use became apparent, it would hopefully trigger more governmental

intervention to regulate, if not completely close down, the tanning salons; research regarding specific, effective governmental controls and their usefulness would be enlightening. Finally, it would be generally helpful to have a thorough review of the literature world-wide to determine what international programs have been successful in combating skin cancer and which could be adapted for our use in this country.

Implications

Results of this study demonstrate that women's beliefs in health self-efficacy predict sunscreen use but not tanning bed and booth use. These results are confirmed by other studies. It appears, however, that the use of sunscreen remains limited and perhaps on the decline; tanning bed and booth use seems to be declining but not to the extent it should considering its deleterious effects.

Having established that educational programs are effective, the practical implications for social change of this study's identification of the theoretical concept of health self-efficacy as a predictor of sunscreen use are clear: future educational programs created to inform people about skin cancer and its prevention should promote people's self-esteem, and emphasize people's abilities of self-care and the achievement of skin protective goals. Having established that sunscreen use and tanning bed and booth avoidance by females in the United States is not close to optimal, the implications for social change are the inclusion in any educational program designed to prevent skin cancer information about sunscreen benefits and tanning bed and booth dangers. Reducing the incidence of skin cancer will not only save lives and lessen medical treatments generally, it will also reduce the huge financial burdens now placed on local

and federal governments for medical interventions not otherwise covered by private health insurance. Hill, Dobbinson, & Makin (2009), based on an economic assessment of the results of a very successful Australian and New Zealand skin cancer prevention campaign, stated that it is apparent that a decrease in skin cancer incidence in young cohorts as a result of skin cancer prevention programs are an eminently worthwhile [national] investment.

Summary

Despite seemingly uncomplicated ways to prevent skin cancer, the incidence of skin cancer is increasing in the United States (Centers for Disease Control and Prevention, 2016a). One of the reasons given for this anomaly is that people have underlying motivations that influence their attitudes and behaviors about tanning and skin cancer (many feel a tan gives them a healthy and attractive appearance and will risk skin cancer to obtain this look [Dar-Nimrod et al., 2014]). The current study determined that a motivating factor for sunscreen use is health self-efficacy. This information can be used to design skin cancer prevention programs, that for example, reinforce self-care vs. vanity. Sunscreen is an effective means to limit the incidence of skin cancer (Cancer Research, UK, 2016). More sunscreen use, properly applied, means more lives saved and reduced medical costs, for individuals as well as the nation as a whole.

The results regarding health self-efficacy predicting tanning bed and booth use were not significant, and like sunscreen use, no change in indoor tanning device use was found between 2008 and 2014. While more research is needed about the motivating forces that compel people to frequent indoor tanning salons, enough is known about the

skin cancer risks, and enough is known about the general ineffectiveness of educational programs, to claim the immediate necessity of making a greater effort to inform the public of their danger. There is no question that less tanning bed and booth use would also save lives and bring national medical costs down.

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