## ABSTRACT

JOHNSON, A. M. Patterns of artificial tanning use and the perceived risk of skin cancer by high school students in a midwestern city. MPH in Community Health Education, May 1996, 74 pp. (G.D. Gilmore)

This prospective prevalence study was designed to identify patterns of artificial tanning use and determine the perceived risk of skin cancer among adolescents at two high schools. Four hundred and sixty subjects completed a 2 part, 41-item questionnaire. Results indicated that females were significantly ($p < .05$) more knowledgeable of risks of artificial tanning devices (ATD), and used ATD's more than males (chi-square value = 29.738). Similar results indicated that juniors were more knowledgeable ($p < .05$) and used A.T.D's more frequently (chi-square value = 21.121) than freshmen subjects. Perceptions of the seriousness of skin cancer varied significantly ($p < .05$) between female and male subjects. This was not true between freshmen and junior subjects ($p > .05$). All subjects varied significantly in the distribution of perceptions regarding 1) how treatable skin cancer is, 2) how preventable skin cancer is, 3) how likely subjects will get skin cancer, and 4) how often they think about skin cancer. There were no significant differences ($p > .05$) between either group (e.g., females vs. males or freshmen vs. juniors) regarding reported number of visits to tanning salons, length of tanning session, and use of eye protection. There were also no significant associations ($p > .05$) between subjects' perception of getting skin cancer in the future and knowledge of tanning booths, length of tanning session, and use of eye protection. Recommendations are made for future research.

# PATTERNS OF ARTIFICIAL TANNING USE AND THE PERCEIVED RISK OF SKIN CANCER BY HIGH SCHOOL STUDENTS IN A MIDWESTERN CITY

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ANGELA MARIE JOHNSON

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Candidate: ANGELA MARIE JOHNSON

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The candidate has successfully completed the thesis final oral defense.

[signature] 12/4/95
Thesis Committee Chairperson — Date

Rodney C. Mowbray 12/5/95
Thesis Committee Member Signature — Date

Margaret F. Lash 12/11/95
Thesis Committee Member Signature — Date

This thesis is approved by the College of Health, Physical Education, and Recreation.

[signature] 2-2-96
Associate Dean, College of Health, Physical Education, and Recreation — Date

[signature] 18 February 1996
Dean of Graduate Studies — Date

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# CHAPTER I

# INTRODUCTION

## Background

Each year skin cancer, the most common form of cancer in the U.S., claims thousands of lives. It is a worldwide disease and reaching epidemic proportions; approximately 800,000 cases a year are diagnosed (American Cancer Society, 1995). Estimations by Farber and Nall (1993) suggest that one in six Americans will develop skin cancer and approximately 9,300 deaths will occur this year (American Cancer Society, 1995).

There are three main types of skin cancer; basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and malignant melanoma (MM) (Austoker, 1994). Although BCC and SCC are highly curable, Mermelstein and Riesenberg (1992) state they have "serious consequences, not the least of which is the potential gross disfigurement that can occur from the removal of facial lesions and the resulting high emotional and health care costs" (p. 371). Malignant melanoma, on the other hand, is the most serious and deadliest form of skin cancer (Kamin, O'Neill, & Ahearn, 1993). Both incidence and death rate of melanoma have risen significantly over recent years. Austoker (1994) maintains that since 1974, the number of people dying from melanoma has increased by 73%, while incidence has risen by 156%. Children born today

have a four to five times greater risk of developing melanoma in their lifetime than their parents (Kamin et al., 1993). Factors contributing to the increased risk may include larger numbers of people living and vacationing in southern latitudes and the growth and popularity of tanning salons (Jones & Leary, 1994).

There are several risk factors associated with skin cancer. Prior to the 20th century, the sun was considered the main source of human skin exposure. More recently, however, artificial devices are now capable of mimicking the emission of some or all of the solar spectrum which have compounded the opportunities and risks of UV radiation (UVR) exposure (National Institutes of Health, 1991, p. 608). Health problems associated with exposure to artificial tanning devices include erythema, vesiculation, keratoses, basal cell, and/or squamous cell carcinoma, and malignant melanoma (Oliphant, Forster, & McBride, 1994). According to the U.S. Centers for Disease Control and Prevention, other complications from artificial UVR exposure include eye injuries, skin burns, and suppressed immune system response (Burns, eye injuries, 1989). Studies reveal that even though many Americans are cognizant of the risks involved, a large percentage continue to engage in activities that increase their chances of developing skin cancer (Gilmore, 1989).

Despite the risk factors involved with artificial tanning, approximately one million Americans use tanning booths each day, with more than 50% of these patrons being adolescents (Mermelstein & Riesenberg, 1992). Unfortunately,

adolescents, more than any other group, believe that a suntan can protect them against skin cancer (Marks, 1988). In addition, most associate a tanned body with "good health, good wealth, leisure time, social status, beauty, and high fashion" (Greeley, 1991, p. 17). Mermelstein and Riesenberg (1992) suggest such behaviors and attitudes clearly place teens at risk for skin cancer.

Exposure to artificial ultraviolet radiation is a risk factor that can be modified, provided that people are aware of dangers. Organizing effective prevention campaigns is essential, however, more must be learned about the tanning habits of children and adolescents (Grob, Guglielmina, Gourvernet, Noe, & Bonerandi, 1993). Jones and Leary (1994) maintain that adolescents are particularly good candidates for research because the degree of UVR exposure in early life predicts the emergence of skin cancer in later years. Unfortunately, "The lack of national assessments of tanning knowledge, attitudes, and behaviors hinder development of an informed strategy for reducing incidences of skin cancer" (Fairchild & Gemson, 1992, p. 383).

## Need for the Study

Tanning facilities in the target research area and other communities in Wisconsin are available and easily accessible. However, to the investigators' knowledge, no studies have been conducted to determine tanning behaviors and the perceived risk of skin cancer of local adolescents. The need for further investigation is supported and recommended by several researchers (Miller,

Ashton, McHoskey, & Gimbel, 1990; Morison, 1988; National Institutes of Health, 1991; Oliphant et al. 1994; Dr. Steven Webster, 1995 July 14). The information gained in this area will be beneficial in assessing the health risks of today's youth.

## Statement of the Problem

The purpose of this prospective prevalence study is to determine the patterns of artificial tanning use and the perceived risk of skin cancer by students at two public senior high schools in a midwestern city.

## Null Hypotheses

This study had the following null hypotheses:

1. There is no statistically significant difference between females and males in knowledge of risks of artificial tanning devices.
2. There is no statistically significant difference between freshmen and juniors in knowledge of risks of artificial tanning devices.
3. There is no statistically significant difference between females and males in their reported behavior related to tanning salon use.
4. There is no statistically significant difference between freshmen and juniors in their reported behavior related to tanning salon use.
5. There is no statistically significant difference between females and males in their reported number of visits to a tanning salon.

6. There is no statistically significant difference between freshmen and juniors in their reported number of visits to a tanning salon.
7. There is no statistically significant difference between females and males in the length of tanning sessions at a tanning salon.
8. There is no statistically significant difference between freshmen and juniors in the length of tanning sessions at a tanning salon.
9. There is no statistically significant association between any reported injury and reported length of tanning session related to tanning salon use among all subjects.
10. There is no statistically significant difference between females and males and reported use of eye protection.
11. There is no statistically significant difference between freshmen and juniors and reported use of eye protection.
12. There is no statistically significant difference between the reported number of visits to a tanning salon and reported visits to a doctor, dermatologist, or emergency room resulting from use of a tanning salon among all subjects.
13. There is no statistically significant difference between females and males in their perceptions of getting skin cancer in the future.
14. There is no statistically significant difference between freshmen and juniors in their perception of getting skin cancer in the future.

15. There is no statistically significant association between number of reported visits to a tanning salon and perceptions of getting skin cancer in the future among all subjects.

16. There is no statistically significant difference between females and males in their perceptions of the seriousness of cancer.

17. There is no statistically significant difference between freshmen and juniors in their perceptions of the seriousness of cancer.

18. There is no statistically significant association between skin type and reported number of visits to a tanning salon among all subjects.

19. There will not be an unequal distribution of the subject population regarding the treatability of skin cancer.

20. There will not be an unequal distribution of the subject population regarding the preventability of skin cancer.

21. There will not be an unequal distribution of the subject population regarding how likely they will get skin cancer.

22. There will not be an unequal distribution of the subject population regarding how much subjects think about skin cancer.

23. There is no statistically significant association between subjects' perception of getting skin cancer in the future and knowledge of tanning booths.

24. There is no statistically significant association between subjects' perception of getting skin cancer in the future and length of tanning sessions.

25. There is no statistically significant association between subjects' perception of getting skin cancer and use of eye protection while using a tanning booth.

## Assumptions

This study had the following assumptions:

1. It is assumed that all subjects responded honestly to each question on the questionnaire.

## Delimitations

This study had the following delimitations:

1. This study was delimited to freshmen and juniors at two public senior high schools in a midwestern city.

## Limitations

This study had the following limitations:

1. This study was limited to students in Health and Physical Education classes.
2. Self-reported measures for frequency of tanning were used for this study.
3. The population participating in this study was primarily Caucasian.

4. Students may have underestimated their level of exposure as influenced by social desirability.

## Definition of Terms

The following terms were used in this study:

Actinic Keratosis - "A horny, keratotic, premalignant lesion of the skin caused by excess exposure to the sunlight" (Taber's Cyclopedic Medical Dictionary, 1993).

Basal Cell Carcinoma - "A type of skin cancer in which the cancer cells resembles the basal cells of the epidermis" (National Cancer Institute [NCI], 1990).

Cancer - "A general term for more than 100 diseases in which abnormal cells grow and multiply rapidly. Cancer cells can spread through the blood or lymphatic system to start new cancers in other parts of the body" (NCI, 1990).

Erythema - "A form of macula showing diffused redness over the skin" (Taber's Cyclopedic Medical Dictionary, 1993).

Immune System - "The complex group of organs and cells that defend the body against infection and disease" (NCI, 1992a).

Melanoma - "Cancer that begins in melanocytes. Melanoma appears on the skin as a new or changing mole" (NCI, 1992a).

Nonmelanoma Skin Cancer - "Skin cancer that does not involve melanocytes. Basal cell cancer and squamous cell cancer are nonmelanoma skin cancer" (NCI, 1992b).

Risk Factor - "A substance or condition that increases an individual's chance of getting a particular type of cancer" (NCI, 1992b).

Squamous Cell Carcinoma - "A type of skin cancer in which the cancer cells resemble the squamous cells of the epidermis" (NCI, 1992b).

Ultraviolet Radiation - "Cancer causing energy that comes in the form of rays from the sun; also called UV radiation" (NCI, 1990).

Vesiculation - "Formation of vesicles or state of having or forming them" (Taber's Cyclopedic Medical Dictionary, 1993).

# CHAPTER II

# REVIEW OF RELATED LITERATURE

## Introduction

This chapter summarizes literature related to incidence of skin cancer, risk factors for skin cancer, perceived risk of skin cancer, artificial ultraviolet radiation (UVR) exposure, and attitudes and knowledge toward UVR exposure.

## Incidence of Skin Cancer

The incidence of melanoma in the U.S., according to the National Institutes of Health, has risen steadily over the past 50 years. It is estimated that the occurrence of melanoma has increased about 4% per year (American Cancer Society, 1995). The incidence of other skin cancers, such as basal and squamous skin cancers have also increased. The increase in incidence can be greatly attributed to behavioral and lifestyle changes among individuals in society (Hacker & Flowers, 1993).

In a historical review, Gallagher, Ma, McLean, Yang, Ho, Carruthers, and Warshawski (1990) examined the incidence of nonmelanoma skin cancers from 1973 to 1987. In this study, the frequency of basal cell carcinoma increased 48.4% in women and 60.6% in men. During the same 15 year period, the increase in squamous cell cancer for women and men increased 67.4 and 59.2%, respectively. Although basel cell carcinoma is most common and its

causes lie in childhood sun exposure, development usually does not occur for up to 40 years (Anastasiou, 1991). Cited as the least dangerous form of skin cancer, it may destroy surrounding tissue and become fatal (Anastasiou, 1991). "Of the 2,500 annual deaths from nonmelanoma skin cancer, the majority (about 75%) can be attributed to the more serious type - squamous cell carcinoma" (National Cancer Institute, 1990).

The incidence of nonmelanoma skin cancer, according to Truhan (1991), has been associated with long term cumulative exposure. Melanoma, however, is associated with short intense UVR exposure and/or blistering sunburns during childhood. It is suggested that a severe sunburn in childhood somehow results in adult melanoma (Anastasiou, 1991). Current research by Austoker (1994) maintains that melanoma is one type of cancer to affect young adults. For individuals, aged 15-34, it is the third most common form of cancer in females and seventh most common form of cancer in males (Austoker, 1994). "If not caught early, it spreads rapidly to other parts of the body through the lymphatic and blood vascular systems and becomes difficult to control" (Kamin et al., 1993, p. 313).

According to Ko, Walton, Keczkes, Bury, and Nicholson (1994), "the rising incidence of both malignant melanoma and nonmalignant skin cancers is becoming a major health problem, particularly in fair-skinned populations" (p. 271). Ko et al. (1993) suggest that the mortality rate may rise above that of

other diseases in the future. Current statistics estimate that "the mortality rate for melanoma is 20%, second only to lung cancer... If this trend continues, by year 2000 1:90 Americans will develop melanoma" (Kamin et al., 1993, p. 313).

## Risk Factors for Skin Cancer

The growing incidence of all skin cancers have concerned many researchers. As a result, several studies have identified numerous risk factors associated with the disease.

According to the 1993 publication "What You Need to Know About Melanoma," several factors are associated with melanoma. One factor clearly associated with the risk of melanoma is exposure to natural sources of ultraviolet radiation. A second risk involves family history of skin cancer. Specifically, risk will increase if two or more members in the family have the disease. A third concern includes those individuals who have a large number of dysplastic nevi (atypical moles) (National Cancer Institute [NCI], 1993).

Other risk factors directly relate to childhood sun exposure. For example, it is estimated that three or more blistering sunburns during adolescence, the first 10 to 20 years, doubles one's chances of melanoma (Greeley, 1991; Mermelstein & Riesenberg, 1992). In addition, melanoma occurs most frequently in individuals who are fair skinned, freckle, burn easily, have red or blonde hair, and blue or light colored eyes (NCI, 1993).

According to the NCI (1992b), several risk factors are associated with nonmelanoma skin cancers. Similar to melanoma, a risk factor associated with basal and squamous cell carcinoma includes lifetime exposure to the sun. However, artificial sources of UV radiation, such as sunlamps or tanning booths, are also included. Additional factors, as noted by Truhan (1991), include fair skin types and family history of skin cancer. For all types of skin cancer, those who live in sunnier climates are also at risk (Truhan, 1991).

It is suggested that more than 95% of nonmelanoma skin cancers can be completely cured (National Institutes of Health, 1991). The cure rate could increase to 100% if signs and symptoms are brought to the attention of physicians before the cancers had a chance to metastasize. "Melanoma can also be cured if diagnosed and treated when the tumor is thin and has not deeply invaded the skin" (NCI, 1993, p. 6).

In a discussion of mortality rates, Davidson and Wolfe (1986) discuss encouraging findings for those with melanoma and nonmelanoma skin cancers. Their findings suggest that mortality rates, for basal and squamous cell carcinoma, can potentially be decreased to almost zero by early detection and adequate treatment. The mortality rate, although higher for melanoma skin cancer, can also be substantially reduced by early detection and proper surgical procedures.

Although skin cancers are the most common form of cancer, Katz and Jernigan, (1991) note they are the most curable and preventable. In a concluding comment, they state "...the condition rarely occurs in people who avoid sun exposure or use appropriate sun protection measures" (p. 425).

## Perceived Risk of Skin Cancer

"It is increasingly apparent," according to Jessor (1991), "that much of the burden of illness...can be linked to patterns of human behavior" (p. 598). Jessor (1991) suggests that researchers are beginning to associate behavior as a risk factor. Risk factors, are referred to as "...agents or conditions that are associated with an increased probability of outcomes that compromise health, quality of life, or life itself" (Jessor, 1991, p. 597). Leary and Jones (1993) assert that one's subjective estimates of the probability and seriousness of illness can greatly impact behavior.

According to Weinstein (1980), "...people tend to think they are invulnerable. They expect others to be victims of misfortune, not themselves" (p.806). Teenagers are particularly subject to this mode of thinking, described by Moore and Rosenthal (1992), as the personal fable. Personal fable is a "...kind of cognitive, egocentrism, or belief that one is special, unique, and invulnerable to the risks and hazards that beset other mortals" (Moore & Rosenthal, 1992, p. 177). Similarly, Eiser, Eiser, and Pauwels, (1993) identify a "...tendency termed 'unrealistic optimism' by Weinstein (1981) for people to

claim that they are less at risk than their peers" (p. 394). According to Eiser et al. (1993) Weinstein hypothesized that optimistic biases would most likely occur when individuals infer that if a problem has not currently posed a threat, the future likelihood is slim. In addition, biases will also occur when pertinent information is lacking. Whether defined as a personal fable or unrealistic optimism, "...underestimating risk may predispose adolescents to engage in unsafe behaviors in the belief that the probable outcomes of these behaviors are not likely to happen to them" (Moore & Rosenthal, 1992, p. 177). The enhancement of self-esteem, as suggested by Eiser et al. (1992) aids in allowing one to believe they are at less risk than others. Moore and Rosenthal (1992) also propose that "individuals tend to imagine a stereotype of a kind of person to whom a negative event might occur, such as stereotyping AIDS victims as homosexuals" (p. 178). This serves

> ...as an ego-defensive distancing function by allowing individuals to ignore the possibilities that some or even many who experience the event may not fit the stereotype or to concentrate only on the superficial differences between themselves and the stereotype and fail to see fundamental similarities. (Moore & Rosenthal, 1992, p. 178)

Past research on health attitudes and behavior has typically focused on habits, such as smoking or seat-belt use, and its associated risks. However, the variation in risk (e.g., whether short or long term) impacts on the extent of actual threat posed to the individual (Moore & Rosenthal, 1992).

> For AIDS, skin cancer, and lung cancer, the "lead" time between risky behavior and expression of symptoms is long, whereas for car accidents and STDs the relevant risky behaviors, if they are to cause harmful

> effects, do so relatively quickly. It would be expected that, on average, the greater the time between risky behavior and its negative consequences, the greater the likelihood that risks would be underestimated (Moore & Rosenthal, 1992, p. 179).

As many studies indicate, skin cancer is an increasing epidemic and many researchers have attempted to identify the social and demographic factors associated with measures taken to avoid skin cancer (Eiser et al., 1993). Keesling and Friedman (1987) note specific factors that are affiliated with protecting oneself from the sun. These include knowledge about skin cancer, knowing someone with skin cancer, and high levels of anxiety. As stated by Leary and Jones (1993), those who believe "...that their health is affected by their own behavior (as opposed to chance, for example) should be more likely to take precautions regarding exposure to the sun" (p. 1393).

Previous research by Leary and Jones (1993), Moore and Rosenthal (1992), and Eiser et al. (1993) suggest that women and men differ in their approach toward UVR exposure. "Although women value sunbathing and are attracted to its pleasures more highly than men, they are typically more conscientious of its consequences and more inclined to engage in protection measures " (Eiser et al., 1993, p. 400). According to Leary and Jones (1993), women also tend to score higher on tests of knowledge about skin cancer and estimate their risk higher than that of men. Eiser et al. (1992) maintains that males are typically less likely to wear sunscreens and have less of a tendency to wear protective clothing.

Specific to teenagers, research by Leary and Jones (1993), state that most young adults hesitate taking appropriate precautions against excessive sun exposure. Specific to artificial UVR exposure, Oliphant et al. (1994) found supporting evidence that indicated

> ...adolescents, especially females, use commercial tanning devices at high rates, begin tanning indoors at young ages, and often do not engage in protective behaviors. Especially alarming is the number of weekly tanners (15% of tanners) and the number who infrequently or never use goggles while tanning indoors (30% of tanners) (p. 478).

As suggested by Berado (1986) "...one's basic attitudes toward life determine the kinds of risks people are willing to take" (p. 405). Attitudes, habits, and their associated risks greatly impact on the quality and longevity of survival (Berado, 1986).

## Artificial Ultraviolet Radiation Exposure

Originally gaining popularity in the 1970's, artificial tanning devices were claimed safer than natural solar radiation. As a result, Morison (1988) found that such claims attracted segments of the population incapable of tanning. However, after further investigation, the Food and Drug Administration (FDA), American Medical Association, and American Association of Dermatology found claims to be misleading and contribute to users false sense of security (Beyth, Hunnicutt, & Alguire, 1991).

Even though claims were denounced, the popularity of artificial tanning devices continues. According to Moore and Rosenthal (1992) each day one

million Americans expose themselves to artificial UVR, of more than half of which are adolescents, and Mawn and Fleischer (1993) state that tanning salon patronage remains constant.

A recent study by Oliphant et al. (1994) surveyed adolescents use of tanning facilities. Of the 987 adolescents surveyed, 28% reported using a tanning facility at least once per month and 15% tanned once a week or more. Ranging in ages from 9 to 18, more than half of the subjects reported first use of a tanning device before the age of 15. The reported average length of use ranged from 5 to more than 60 minutes. Even though the majority of participants reported use between 21 - 30 minutes, 11% reported tanning for more than 30 minutes (Oliphant et al., 1994). Also, of the population surveyed, "Fifty-nine percent reported some skin injury, including burned, blistered or peeled skin and/or rashes" (Oliphant et al., 1994, p. 477). In addition, 16% of adolescents had reported experiencing one or more eye problems (e.g., pinkeye, eye burns, or sandy or gritty eyes).

When inquiring about knowledge of tanning devices Oliphant et al. (1994) indicated that

> Of the students surveyed, 71% knew that indoor tanning is not safer than natural sunlight, 79% knew that indoor tanning could cause skin cancer, and 77% were aware that damage could occur from tanning even without a sunburn. Only 22% of adolescents knew that tanning is more harmful to adolescents than adults. (p. 478)

In reality, "commercial tanning devices emit either mostly ultraviolet A or mostly ultraviolet B. Although ultraviolet B injures the skin faster, ultraviolet A penetrates the skin more deeply" (Oliphant et al., 1994, p. 476). Injuring the skin more quickly, via sunburn, ultraviolet B (UVB) causes dermal connective tissue destruction, whereas deep penetration of ultraviolet A (UVA) causes connective tissue alteration (Truhan, 1991). Not only do some commercial tanning beds possibly emit 10 times more UVA than the natural sunlight (Oliphant et al., 1994), but both UVA and UVB contribute to the photoaging process (Truhan, 1991). Despite the cosmetic appeal, a tan is a signal that skin injury has occurred and each time the skin is darkened in response to UVR exposure, the chances of developing skin cancer late in life are increased.

Many complications may arise from the use of artificial tanning devises. For example, during 1986 and 1987, the Wisconsin Division of Health, Radiation Protection Services surveyed a variety of health professionals in the state of Wisconsin to ascertain the number of artificial-tanning related injuries. Of the ophthalmologists surveyed, 132 reported treating 152 patients for corneal, retinal, and other eye injuries. The 344 dermatologists and emergency room physicians surveyed reported treating a total of 220 patients for burns. One half of these patients were diagnosed with first degree burns (Burns, eye injuries, 1989). Greeley (1991) maintains that a suppressed immune system is another problem associated with exposure to artificial ultraviolet radiation. According to

a student handout issued by the FDA, certain chemicals in foods, medications and cosmetics can potentially increase the chances of allergic or toxic reactions, usually in the form of an exaggerated sunburn or swelling (FDA, 1987). Unfortunately, many injured users neglect to take the appropriate steps in seeking medical attention, instead they may wait until injuries heal before resuming tanning.

Research of adolescent tanning behavior, conducted by the Anti-Cancer Council of Victoria, has suggested that teens more than any other group desire a dark tan and believe the effort to maintain the look is worthwhile (Marks & Hill, 1988). According to Mermelstein and Riesenberg (1992), 50% of teens surveyed reported to intentionally work on tans and 72% perceived a tan as contributing to a healthy look. Similarly, only 50% of teens accept the chance that they may be diagnosed with skin cancer (Marks, 1988) and according to Mermelstein and Riesenberg (1992) such behaviors and attitudes clearly place this population at high risk for skin cancer.

## Attitudes and Knowledge Toward UVR Exposure

Historically, the adoration and desires for sun exposure by many individuals began as part of the heliotherapy craze in Europe in the early 1900's and was introduced to this country in 1914 (Keesling & Friedman, 1987). "Heliotherapy", as defined by Keesling and Friedman (1987) "originated with the work of Rollier who was the first to note that patients with certain diseases, such

as tuberculosis, improved following sun exposure" (p. 479). The linked association with sun exposure and a tanned body began to represent good health, whereas paleness, was indicative of disease and associated with poor health (Miller et al., 1990). However, during the Industrial Revolution paleness received new meaning. According to Keesling and Friedman (1987) dark or tanned skin became the desired skin color and was affiliated with leisure time and outdoor activities. "Although the medical benefits were discredited in the 1940s and early 1950s, possession of a tan retained its popularity" (Keesling & Friedman, 1987, p. 480).

As tanning continued in its popularity, fashion magazines became a resource perpetuating stereotypes associated with tanning. In a 1958 Cosmopolitan article, authors stated that the possession of a tan was imperative for anyone because a "...lack of tan might indicate a sign of emotional problems and/or lack of social skills." They continued to state "other characteristics that supposedly could be inferred from the possession of a tan included ... superior physique, intelligence, and moral character" (Keesling & Friedman, 1987, p. 480).

Evidence from current studies indicate that many of the attitudes noted in the late 1950's are prevalent in today's society. A recent study by Broadstock, Borland, and Gason (1992) found that sunbathers appear to be more concerned with their appearance of health than with actual health. Evidence of this is

reflected in a study by the American Academy of Dermatology. Results of a telephone survey of over 1,000 individuals indicated that although adults and adolescents are aware of the deleterious effects of sun exposure, a reported 75% of adolescents and 66% of adults believe tans make people look healthy (Gilmore, 1989). As stated by Greeley (1991), a tanned body is often associated with "...good health, good wealth, leisure time, social status, beauty, and high fashion" (p. 17). In an effort to reduce the numbers of those effected by skin cancer, several studies conclude that public health interventions should work towards challenging society's perceived benefits of UVR exposure.

In an attempt to investigate current public knowledge of skin cancer, the American Academy of Dermatology surveyed over 1,000 individuals. Results of the survey indicated that 96% of the individuals were cognizant of at least one negative impact of sun exposure (Gilmore, 1989). However, despite their knowledge, 33% of adolescents and 26% of adults reported not taking appropriate precautions. In addition, 66% of teen-age girls, 34% of teen-age boys, and 60% of adults reported to intentionally work on a tan.

Several studies investigating the relationship of knowledge and sun exposure have concluded that many individuals are cognizant about the ill-effects of tanning. However, even though many are knowledgeable about skin cancer and view it as a dangerous disease, several continue to engage in activities that put them at risk (Broadstock et al., 1992). Despite such warnings,

many segments of the population continue to dismiss or deny skin cancer warnings (Broadstock et al., 1992).

Similar studies surveying the relationships between knowledge of skin cancer and tanning behaviors have found comparable results. Two variables most likely contributing to such behaviors are poor attitudes and lack of knowledge. Berrenberg (1991) suggests that the "...attitudes one holds about cancer influence health-related behavior such as preventive self-care, the recognition of early warning signals, and the seeking of early medical intervention" (p. 35).

In an attempt to further understand how both knowledge and attitudes contributes to this disease, many researchers encourage further investigation in this area. It is recommended that "...preventive efforts to reduce the incidence of melanoma should focus on the behaviors of children and adolescents" (Weinstock, Colditz, Willett, Stampfer, Bronstein, Mihm, & Speizer, 1989, p. 203).

## Summary

To organize effective prevention campaigns, more must be learned about sunbathing and artificial ultraviolet radiation exposure habits in children and adolescents (Grob et al., 1993). Research has indicated that teens' behaviors and attitudes clearly place them at risk for skin cancer. Campaigns to educate about the carcinogenic effects of solar radiation need to be intensified and schools are opportune environments to introduce health concepts. Not only are

youth accessible, but "...they are segregated by developmental stages and are at a point in their life where health-related attitudes can be influenced as they are being formed before unhealthy behaviors becomes difficult to change" (Anderson & Portnoy, 1989, p. 215).

# CHAPTER III

# METHODS AND PROCEDURES

## Introduction

This prospective prevalence study attempted to determine the perceived risk of skin cancer and frequency of visits to artificial tanning facilities made by students attending two public senior high schools in a midwestern city. The components of this chapter will include subject selection, instrument development, methods and procedures, and statistical treatment.

## Subject Selection

The population used for this prospective prevalence study was comprised of students from two public senior high schools in a midwestern city during the spring semester of 1995. The subjects were females and males and reported being between 14 to 18 years of age. Only those enrolled in freshmen physical education and junior health classes were utilized for this study. Of the 602 students who received surveys (see Appendix A), 460 (76.4%) returned them fully completed.

It was the researcher's intent to use a sampling of all freshmen and juniors. However, the researcher had no control over the source points of freshmen and junior subjects. The School District Research and Development Committee determined that subjects would be derived from physical education and health classes.

## Instrument Development

The questions used in the survey were derived from two studies. The questions regarding tanning behavior originated from a study titled "The Use of Commercial Tanning Facilities by Suburban Minnesota Adolescents." Permission to utilize the survey was received via telephone and facsimile from the senior author Dr. Jean Forster (J. L. Forster, personal communication, January 19, 1995). Dr. Forster is with the University of Minnesota School of Public Health. The questions regarding perceived risk of skin cancer were derived from a study titled "Skin Cancer: Assessing Perceived Risk and Behavioural Attitudes." Permission to utilize the perceived risk of skin cancer scale was also received via telephone and facsimile from the senior author Dr. J. Richard Eiser from the University of Exeter, located in Exeter, England (J. R. Eiser, personal communication, February 14, 1995). The researcher communicated with Dr. Eiser and it was learned that only face validity was established for the surveys. Additionally, Dr. Eiser recommended that the surveys be used if the researcher determined that they would meet the needs of the study.

Prior to distribution, the surveys were pilot tested with adolescents from two groups, the "Teen Advisory Group" (TAG) and the "Teen Empowerment Program" (TEMP) at Lutheran Hospital in La Crosse, Wisconsin. Members from TAG, ages 14 to 18, serve as an advisory board to assist in addressing issues

facing teens and help to create healthy solutions. The purposes of TEMP, targeting youth ages 10-18, are to assist youth in increasing personal awareness, assertiveness, and decision making skills. Members (n = 17) agreeing to participate completed a survey (see Appendix A) and reaction form (see Appendix B). The purpose of the reaction form was to determine if survey questions were understandable and if any questions made students feel uncomfortable. All participants reported that: (1) the survey questions were understandable, (2) there was not a need for further clarification of any questions, and (3) they felt comfortable while taking the survey.

## Methods and Procedures

In May of 1995, 602 surveys were distributed to two area high schools in La Crosse, Wisconsin. However, prior to data collection, all requirements set by the La Crosse School District's Research and Development Committee were fulfilled. Upon receiving permission from the school district, the researcher met with the respective high school principals to discuss details of the project. The purpose of the meeting was to determine appropriate times and dates the researcher would return to each school to disseminate the surveys. In addition, the researcher received a list of names and room locations for all physical education and health education teachers.

During the week of May 8th - 12th, the investigator traveled to each high school to administer and collect the 2-part, 41-item questionnaires. In addition

to demographics, the questionnaires included items regarding tanning behavior and perceived risk relating to skin cancer. All questionnaires included a cover letter.

## Statistical Treatment

For this study, the statistical methods chosen were based upon levels of the independent and dependent variables. An outline of all hypotheses is located in Appendix C.

For hypotheses 1, 2, 5 - 8, 10 - 14, 16 and 17 the Wilcoxon rank sum test (also referred to as the Mann-Whitney U test) was performed. For these hypotheses, the following assumptions for the use of the Wilcoxon rank sum test were met.

For hypothesis 1 the dependent variable, knowledge of risks of artificial tanning devices, generated ordinal level data and the independent variable, gender, divided the data into two independent samples.

For hypothesis 2 the dependent variable, knowledge of risks of artificial tanning devices, generated ordinal level data and the independent variable, grade level, divided the data into two independent samples.

For hypothesis 5 the dependent variable, number of visits to a tanning salon, generated ordinal level data. The independent variable, gender, divided the data into two independent samples.

For hypothesis 6 the dependent variable, number of visits to a tanning salon, generated ordinal level data. The independent variable, grade level, divided the data into two independent samples.

For hypothesis 7 the dependent variable, length of session at a tanning salon, generated ordinal level data and the independent variable, gender, generated two independent samples.

For hypothesis 8 the dependent variable, length of session at a tanning salon, generated ordinal level data and the independent variable, grade level, generated two independent samples.

For hypothesis 10 the dependent variable, use of eye protection, generated nominal level data and the independent variable, gender, divided the data into two independent samples.

For hypothesis 11 the dependent variable, use of eye protection, generated nominal level data and the independent variable, grade level, divided the data into two independent samples.

For hypothesis 12 the dependent variable was reported visits to a doctor, dermatologist, or emergency room resulting from use of a tanning salon. The independent variable, reported visits to a tanning salon, yielded two independent samples.

For hypothesis 13 the dependent variable, perceived chance of skin cancer, generated ordinal level data and the independent variable, gender, divided the data into two independent samples.

For hypothesis 14 the dependent variable, perceived chance of skin cancer, generated ordinal level data and the independent variable, grade level, divided the data into two independent samples.

For hypotheses 16 the dependent variable, perception of the seriousness of skin cancer, generated ordinal level data. The independent variable, gender, yielded two independent samples.

For hypothesis 17 the dependent variable, perception of seriousness of skin cancer, generated ordinal level data. The independent variable, grade level, yielded two independent samples.

For hypotheses 3 and 4, the chi-square test of Independence was performed. For these hypotheses, the following assumptions for the chi-square test of Independence were met.

For hypothesis 3 the dependent variable, reported behavior related to tanning salon use, generated nominal level data. The independent variable, gender, divided the data into two independent samples.

For hypothesis 4 the dependent variable, reported behavior related to tanning salon use, generated nominal level data. The independent variable grade level, divided the data into two independent samples.

For hypotheses 9, 15, 18, 23 - 25 Spearman's rho test was performed. For these hypotheses, the following assumptions for the use of Spearman's rho test were met.

For hypothesis 9 the dependent variable, reported injury, generated ordinal level data and the independent variable, reported length of session, yielded three or more independent samples.

For hypothesis 15 the dependent variable, reported number of visits to a tanning salon, generated ordinal level data. The independent variable, perception of getting skin cancer in the future, divided the data into three or more independent samples.

For hypothesis 18 the dependent variable, reported number of visits to a tanning salon, generated ordinal level data. The independent variable, skin type, divided the data into three or more independent samples.

For hypothesis 23 the dependent variable, knowledge of risks of artificial tanning devices, generated ordinal level data. The independent variable, perception of getting skin cancer in the future, divided the data into three or more independent samples.

For hypothesis 24 the dependent variable, length of tanning session, generated ordinal level data. The independent variable, perception of getting skin cancer in the future, divided the data into three or more independent samples.

For hypothesis 25 the dependent variable, use of eye protection, generated ordinal level data. The independent variable, perception of getting skin cancer in the future, divided the data into three or more independent samples.

For hypotheses 19, 20, 21, and 22 the Kolmogornov-Smirnov one-sample test was performed to determine if there was an equal distribution across the response categories. For these hypotheses, the assumptions for the use of the Kolmogornov-Smirnov one-sample test were met.

# CHAPTER IV

# RESULTS AND DISCUSSION

## Introduction

This chapter presents the results of the hypotheses identified in Chapter I. Each hypothesis will be addressed individually and tables will be presented to clarify the data.

## Results

Hypothesis 1 stated: There is no statistically significant difference between females and males in knowledge of risks of artificial tanning devices. A Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 4.464. Because the p-value (0.0001) was less than the .05 level of significance, the null hypothesis was rejected. Scores for knowledge of risks of artificial tanning devices was higher for females than males. See Table 1.

Hypothesis 2 stated: There is no statistically significant difference between freshmen and juniors in knowledge of risks of artificial tanning devices. A Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 3.912. Because the p-value (0.0001) was less than the .05 level of significance, the null hypothesis was rejected. Knowledge of risks of artificial tanning devices was higher for juniors than freshmen. See Table 1.

Table 1. Results of Wilcoxon rank sum tests

| Hypothesis | Test z-value | p |
|---|---|---|
| 1 | 4.464 | .0001 |
| 2 | 3.912 | .0001 |
| 5 | -1.218 | .2232 |
| 6 | 1.780 | .075 |
| 7 | -0.327 | .744 |
| 8 | -0.803 | .422 |
| 10 | -0.352 | .725 |
| 11 | 0.839 | .402 |
| 12 | 0.839 | .372 |
| 13 | 3.864 | .0001 |
| 14 | 2.404 | .016 |
| 16 | 4.159 | .0001 |
| 17 | 0.982 | .326 |

Hypothesis 3 stated: There is no statistically significant difference between females and males in their reported behavior related to tanning salon use. The chi-square test of independence used to analyze the data for this

hypothesis generated a chi-square value of 29.738. Because this value was greater than the critical value of 3.841 the null hypothesis was rejected. The nature of the difference, as discerned by considering observed versus expected cell counts, suggests that a higher percentage of females use tanning salons more than males. See Table 2.

Table 2. Results of chi-square tests of independence

| Hypothesis | Chi-square value | Critical value |
|---|---|---|
| 3 | 29.738 | 3.841 |
| 4 | 21.121 | 3.841 |

Hypothesis 4 stated: There is no statistically significant difference between freshmen and juniors in their reported behavior related to tanning salon use. The chi-square test of independence used to analyze the data for this hypothesis generated a chi-square value of 21.121. Since this value was greater than the critical value of 3.841, the null hypothesis was rejected. The nature of the difference, as discerned by considering observed versus expected cell counts, suggests that a higher percentage of juniors are using tanning salons more than freshmen subjects. See Table 2.

Hypothesis 5 stated: There is no statistically significant difference between females and males in their reported number of visits to a tanning salon. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of -1.218. Because the p-value (.2232) was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 6 stated: There is no statistically significant difference between freshmen and juniors in their reported number of visits to a tanning salon. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 1.780. Because the p-value (.075) was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 7 stated: There is no statistically significant difference between females and males in the length of tanning sessions at a tanning salon. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of -.327. Because the p-value (.744) was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 8 stated: There is no statistically significant difference between freshmen and juniors in the length of tanning sessions at a tanning salon. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of -.803. Because the p-value (.422) was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 9 stated: There is no statistically significant association between any reported injury and reported length of tanning session related to tanning salon use among all subjects. A Spearman's rho used to analyze the data for this hypothesis generated a correlation coefficient .065. Because the significance probability was .773, greater than the .05 level of significance, the null hypothesis was not rejected. See Table 3.

Table 3. Results of Spearman's rho tests

| Hypothesis | Correlation coefficient | Prob > \|R\| |
|---|---|---|
| 9 | .065 | .773 |
| 15 | .082 | .716 |
| 18 | -.361 | .099 |
| 23 | .238 | .287 |
| 24 | -.187 | .405 |
| 25 | -.273 | .219 |

Hypothesis 10 stated: There is no statistically significant difference between females and males and reported use of eye protection. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score

of -.352. Because the p-value of .725 was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 11 stated: There is no statistically significant difference between freshmen and juniors and reported use of eye protection. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of .839. Because the p-value of .402 was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 12 stated: There is no statistically significant difference between the reported number of visits to a tanning salon and reported visits to a doctor, dermatologist, or emergency room resulting from use of a tanning salon among all subjects. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of .839. Because the p-value of .372 was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 13 stated: There is no statistically significant difference between females and males in their perceptions of getting skin cancer in the future. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 3.864. Since the p-value of .0001 was greater than the .05 level of significance, the null hypothesis was rejected. See Table 1.

Hypothesis 14 stated: There is no statistically significant difference between freshmen and juniors in their perception of getting skin cancer in the

future. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 2.404. Because the p-value of .016 was less than .05 level of significance, the null hypothesis was rejected. See Table 1.

Hypothesis 15 stated: There is no statistically significant association between number of reported visits to a tanning salon and perceptions of getting skin cancer in the future among all subjects. A Spearman's rho test used to analyze the data for this hypothesis generated a correlation coefficient of .082. Because the significance probability was .716, greater than the .05 level of significance, the null hypothesis was not rejected. See Table 3.

Hypothesis 16 stated: There is no statistically significant difference between females and males in their perceptions of the seriousness of cancer. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of 4.159. Because the p-value of .0001 was less than the .05 level of significance, the null hypothesis was rejected. See Table 1.

Hypothesis 17 stated: There is no statistically significant difference between freshmen and juniors in their perceptions of the seriousness of cancer. The Wilcoxon rank sum test used to analyze the data for this hypothesis generated a Z-score of .982. Because the p-value of .326 was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 1.

Hypothesis 18 stated: There is no statistically significant association between skin type and reported number of visits to a tanning salon among all

subjects. A Spearman's rho test used to analyze the data for this hypothesis generated a correlation coefficient of -.361. Because the significance probability was .099, greater than the .05 level of significance, the null hypothesis was not rejected. See Table 3.

Hypothesis 19 stated: There will not be an unequal distribution of the subject population regarding the treatability of skin cancer. A Kolmogornov-Smirnov one sample test used to analyze the data for this hypothesis calculated a value of .063. When comparing the largest difference to that value it was larger than .063 (.202 > .063), thus the null hypothesis was rejected. See Table 4.

Hypothesis 20 stated: There will not be an unequal distribution of the subject population regarding how preventable cancer is. A Kolmogornov-Smirnov one sample test used to analyze the data for this hypothesis calculated a value of .063. When comparing the largest difference to that value it was larger than .063 (.280 > .063), thus the null hypothesis was rejected.

Hypothesis 21 stated: There will not be an unequal distribution of the subject population regarding how likely they will get cancer. A Kolmogornov-Smirnov one sample test used to analyze the data for this hypothesis calculated a value of .063. When comparing the largest difference to that value it was larger than .063 (.171 > .063), thus the null hypothesis was rejected.

Table 4. Rankings of subjects' perception of treatability of skin cancer as analyzed by Kolmogornov-Smirnov one-sample test

| | Responses | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Observed Frequency | 42/460 | 56/460 | 92/460 | 166/460 | 67/460 | 23/460 | 14/460 |
| Expected Frequency | 66/460 | 66/460 | 66/460 | 66/460 | 66/460 | 66/460 | 66/460 |
| Cumulative Observed | 42/460 | 98/460 | 190/460 | 356/460 | 423/460 | 446/460 | 460/460 |
| Cumulative Expected | 66/460 | 132/460 | 198/460 | 264/460 | 330/460 | 396/460 | 462/460 |
| Difference | 24/460 | 34/460 | 8/460 | 92/460 | 93/460 | 50/460 | 2/460 |

Largest absolute difference= 93/460 = .202
1.36 divided by the square root of N = .063
.202 > .063

Hypothesis 22 stated: There will not be an unequal distribution of the subject population regarding how much subjects think about skin cancer. A Kolmogornov-Smirnov one sample test used to analyze the data for this hypothesis calculated a value was calculated of .063. When comparing the

largest difference to that value it was larger than .063 (.232 > .063), thus the null hypothesis was rejected.

Hypothesis 23 stated: There is no statistically significant association between subjects' perception of getting skin cancer in the future and knowledge of tanning booths. A Spearman's rho test used to analyze the data for this hypothesis generated a correlation coefficient of .238. Because the significance probability was .287, greater than the .05 level of significance, the null hypothesis was not rejected. See table 3.

Hypothesis 24 stated: There is no statistically significant association between subjects' perception of getting skin cancer in the future and length of tanning sessions. The Spearman's rho used to analyze the data for this hypothesis generated a correlation coefficient of -.187. Because the significance probability was .405, greater than the .05 level of significance, the null hypothesis was not rejected. See Table 3.

Hypothesis 25 stated: There is no statistically significant association between subjects perception of skin cancer and use of eye protection while using a tanning booth. The Spearman's rho test used to analyze the data for this hypothesis generated a correlation coefficient of -.273. Since the significance probability of .219 was greater than the .05 level of significance, the null hypothesis was not rejected. See Table 3.

## Discussion

The results of this study indicate that 11 of the 25 null hypotheses were rejected. One of the purposes of this study was to gain some perspective on artificial tanning behavior of an adolescent population. One of the significant results was a difference between subjects regarding knowledge of risk of tanning devices. Results indicated that females had a higher score of knowledgeable of artificial tanning devices. Although not directly related to artificial tanning use, Leary and Jones (1993) found that women are typically more knowledgeable about skin cancer. Results also indicated that juniors were more knowledge of the risks of artificial tanning devices than freshmen subjects. Similar to the results regarding knowledge of risks of artificial tanning devices, characteristics of those more likely to use tanning salons are those who are female and at the junior class level.

Another purpose of this study was to gain some perspective on subjects' perceptions of skin cancer. Results indicated that females and males differ in their perceptions of getting skin cancer. This was also true of freshmen and junior subjects. Although this study did not attempt to identify the degree of difference of perception, research by Leary and Jones (1993) suggests that women estimate their risk of skin cancer higher than that of men. In addition, results indicated a statistically significant difference between the perceptions of

females and males regarding the seriousness of skin cancer. However, this was not true between the freshmen and junior subjects.

Lastly, the overall population did vary significantly in their perceptions of (1) the treatability of skin cancer, (2) the preventability of skin cancer, (3) how likely they are to get skin cancer, and (4) how much they think about skin cancer. According to Marks (1988) such findings are typical in an adolescent population. For example, Marks (1988) maintains that only 50% of teens accept the chance that they may develop skin cancer. Their behaviors routinely seem to be appearance driven and therefore continue to perceive a tanned body as healthy. Another factor to greatly influence behavior is one's perception of the seriousness of disease (Leary & Jones, 1993).

# CHAPTER V

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## Summary

The purpose of this study was to investigate artificial tanning behaviors and perceptions of skin cancer among local high school students. Results of this study indicated that 11 of the 25 null hypotheses were rejected.

## Conclusions

Based on the results of this prospective descriptive study, the following conclusions are presented:

1. There was a statistically significance difference regarding knowledge of risks and reported behavior related to artificial tanning devices. The characteristics of the population scoring the highest were females and junior level subjects.
2. There was not a statistically significant association between reported injury and reported length of tanning session.
3. There was not any statistically significant differences discovered between subjects in (1) reported number of visits to a tanning salon, (2) length of tanning sessions, and (3) use of eye protection.
4. There was no statistically significant association between visits to a tanning salon and perceptions of getting skin cancer in the future.

5. There was statistically significant unequal distributions regarding subject population perceptions of (1) the treatability of skin cancer, (2) the preventability of skin cancer, (3) how likely they will get cancer, and (4) how much subjects think about skin cancer.

6. There was no statistically significant association when analyzing the subject sample for knowledge of tanning devices and length of tanning sessions with the subjects' perception of getting skin cancer in the future.

7. There was no statistically significant association between the subjects' perceptions of skin cancer and use of eye protection while using a tanning booth.

## Recommendations

On the basis of the review of literature and the findings of this study, the following recommendations are offered for further investigation:

1. To determine if comparable patterns exist elsewhere, it would be of value to conduct a similar study. In doing so, the investigator would recommend (1) using a larger sample population, (2) include students from all four grade levels, (3) tracking over time (e.g., post-high school), and (4) surveying at a different time in the year, for example late winter or early spring to determine if use increases when people are planning for winter or spring vacations to warmer climates. As stated by Beyth et al.,

(1991), peak business months for tanning salons are January through April.

2. It may be of value to conduct a comparison study between parents and high school students, to determine if similar patterns and perceptions prevail. It also would be useful to survey parents' perceptions of their children's use of artificial tanning devices.

3. Investigations above and beyond this study should go through a validation process to determine the content validity of each scale which comprised the survey instrument.

4. In this investigation, it was noted that people tan at more than one tanning salon a day. One could investigate the degree to which this behavior is occurring in various locales.

5. It would be highly recommended that an investigation be conducted to determine knowledge of risks associated with artificial tanning use among tanning salon operators. As noted by Beyth et al., (1991) tanning booth proprietors do not uniformly inform patrons of hazards of artificial tanning devices, including the possibility of skin cancer. A similar study by Fairchild and Gemson (1992), determined that operators of tanning salons do not adhere to FDA regulations by providing false or misleading information to users of artificial tanning devices. For example, 75% of salon operators informed potential customers that artificial tanning would

not cause a sunburn, and 80% informed potential customers that they would not get skin cancer from artificial tanning (Fairchild & Gemson, 1992).

Based on these conclusions and recommendations, the need for further investigations is considered essential. Tanning salon use among the adolescent population appears to be extensive. Although not a large percentage of teenagers reported tanning salon use in this study, other research has determined that approximately one-half million adolescents use tanning facilities on a daily basis (Oliphant et al., 1994).

Unfortunately, knowledge of risk of artificial tanning does not deter use. Specifically for females, the mere pleasure of using a tanning booth is a factor influencing exposure (Leary & Jones, 1993; Moore & Rosenthal, 1992). In general, individuals are more attracted to the immediate perceived benefits of tanning and disregard the actual risk involved with the behavior.

Another explanation impacting use, as supported by Moore and Rosenthal (1992), may be the long lead time between risky behavior (e.g., use of tanning booth) and the expression of symptoms (e.g., skin cancer) to occur. There are two main reasons why this may be true for the study population in this investigation. First, there was not a significant self-reporting of short-term injuries (e.g., pain or sunburn) sustained from use of tanning. Second, results indicated that the distribution of the subjects' perceptions of getting skin cancer in the future were unequal. Therefore, some students may have underestimated

their risk and believed that the probable outcomes of artificial tanning use were not likely to impact them (Moore & Rosenthal, 1992).

In summary, although it is important to educate youth about the risks involved with artificial tanning, it is imperative to develop and implement an educational plan to challenge the perceptions of today's adolescent. As suggested by Moore and Rosenthal (1992) many teenagers are particularly subject to a mode of thinking described as the personal fable. It is the belief that one is unique and invulnerable to risks that beset other people. Also, if a problem has not yet currently posed a threat to an individual, it will be inferred that the future likelihood is slim (Eiser et al., 1993; Weinstein, 1980).

Many steps can be taken to help reduce the use of artificial tanning devices by adolescents. According to Anderson and Portnoy (1989), health educators can take steps to organize and implement effective school curricula. At the district or school level, health educators should (1) secure administrative support, (2) establish a liaison between local health officials, community organizations, and schools, and (3) involve parents and peer leaders in program planning and behavior change strategies. In addition, coupled with challenging perceptions, health educators, parents and students, may impact use by enacting legislation to prohibit the use of tanning salons by individuals under the age of 18.

The decision to educate today can make a difference in the lives of many in the future. Collectively, parents and educators can help empower young people to not only make healthy decisions, but to feel good about themselves each as special persons in this world.

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# APPENDIX A

# WISCONSIN ADOLESCENT TANNING SURVEY

WISCONSIN ADOLESCENT TANNING SURVEY

MAY, 1995

The University of Wisconsin-La Crosse is conducting a survey with high school students in Wisconsin to learn about the use of suntanning beds or booths. Your school has agreed to participate and I would like to invite you to take part in this survey.

This is a confidential survey. Do not write your name on the questionnaire. You do not have to complete this survey if you do not want to.

Read each question very carefully. Please do not skip questions unless told to do so. Answer each question truthfully and to the best of your knowledge.

I appreciate your help in taking this survey and hope you enjoy taking part in it. Thank you for your help!

Angela Johnson
MPH-CHE Program

Check one of the following:

1. ____ Female

   ____ Male

2. How old are you?

   ____ 13

   ____ 14

   ____ 15

   ____ 16

   ____ 17

   ____ 18

   ____ 19

3. What is your grade?

   ____ 9th

   ____ 10th

   ____ 11th

   ____ 12th

4. What is your race?

____ African American

____ White

____ Native American

____ Hispanic

____ Asian

____ Other

If other, please specify _____

5. Do you have any moles?

____ Yes (if Yes, where located _____ )

____ No

The next few questions are to determine what is your skin type.

6. What color are your eyes? (Check the choice that best applies.)

____ Blue

____ Green

____ Brown

____ Black

____ Hazel

7. What is the natural color of your hair? (Check the choice that best applies.)

____ Blond

____ Brown

____ Black

____ Red

____ White

8. Does your skin freckle (or freckle more) when you go in the sun?

____ Yes

____ No

9. Which of the following best describes your skin type?

____ Always burns easily, never tans

____ Burns easily, tans very little

____ Burns slightly, tans readily

____ Burns very little if at all, tans well

10. How many times in the last 12 months did you get a sunburn that blistered or peeled, from the sun?

____ Not at all

____ Once

____ Twice

____ More than twice

11. How often do you use sunscreen to protect your skin when you are lying out in the sun or doing other activities in the sun?

____ Always

____ Usually

____ Sometimes

____ Never

12. Have you ever used a tanning lamp or tanning bed in your home or someone else's home? (Check all that apply)

____ Yes, my home

____ Yes, someone else's home

____ No

13. Commercial suntanning beds or booths have become popular in Wisconsin. Have you ever used a tanning bed or booth?

____ No ----------> Please skip to Question 30

____ Yes ----------> Please continue

14. How old were you the first time you used a tanning bed or booth?

____ ____ years old

____ Don't know / Can't remember

15. How often do you use a tanning booth or bed now, on average?

____ More than once a week

____ Once a week

____ Several times a month, but not as often as once a week

____ Once per month

____ Several times a year, or on special occasions

____ Once per year or less

16. About how long is each session on average?

____ 5 minutes or less

____ 6 to 10 minutes

____ 11 to 15 minutes

____ 16 to 20 minutes

____ 21 to 25 minutes

____ 26 to 30 minutes

____ more than 30 minutes

17. How long is the longest time you have ever spent in a tanning bed or booth at one time?

____ ____ minutes

18. Do you use sunscreen when using a tanning booth or bed?

____ Never

____ Sometimes

____ Usually

____ Always

19. Do you use goggles for your eyes while using a tanning facility or bed?

____ Never

____ Sometimes

____ Usually

____ Always

20. Have you ever had any of the following problems with your eyes following tanning bed or booth?

20a. Eye burns

____ Yes

____ No

20b. Sandy or gritty feeling in eyes

____ Yes

____ No

20c. Pink eye or eye infection

____ Yes

____ No

Other (specify)_____

21. Have you ever had a sunburn as a result of using a tanning bed or booth?

____ Yes (continue)

____ No -----> please skip to question 22

21a. If yes, was that within the last 12 months?

____ Yes

____ No

21b. If yes, did the pain from the sunburn last two or more days?

____ Yes

____ No

21c. Has your skin ever blistered or peeled from a sunburn as a result of using a tanning bed?

____ Yes

____ No

22. Have you had skin problems other than a sunburn from a tanning bed or booth?

____ Yes

____ No

22a. If yes, please explain _____

23. Have you ever gone to a doctor, a dermatologist, or emergency room as a result of using a tanning bed?

____ Yes

____ No

24. What is the name of the one business where you use a tanning booth or bed most often?

_____

25. Are you told to wear goggles by the tanning booth or bed operator where you tan most often?

____ Always

____ Usually

____ Sometimes

____ Never

26. Are you told to limit the amount of time per session by the tanning bed or booth operator where you tan most often?

____ Never

____ Sometimes

____ Often

____ Always

27. Have you ever been given a warning about the health risks of tanning bed or booth use by the operator where you tan most often?

____ Yes, written

____ Yes, verbal

____ Yes, both written and verbal

____ No, never warned

28. What risks, if any, have you heard about from a tanning equipment operator?

_____

29. Have you ever noticed a sign warning of the health risks of tanning in the business where you tan most often?

____ Yes

____ No

**EVERYONE SHOULD ANSWER THE FOLLOWING QUESTIONS:**

30. Closing your eyes or covering them with cotton balls in a tanning booth or bed is enough to protect them.

____ True

____ False

____ Don't know

31. Most tanning booths or beds are safer for your skin than natural sunlight.

____ True

____ False

____ Don't Know

32. Using a tanning booth or bed could cause skin cancer.

____ True

____ False

____ Don't Know

33. Tanning booth or beds are more harmful to people in their teens than people in their 20's or 30's.

____ True

____ False

____ Don't Know

34. As long as I don't get a sunburn from a tanning booth or bed, I am safe from skin cancer

____ True

____ False

____ Don't Know

35. Have any of the following advised you not to use tanning booths or beds?

____ Nurses

____ Dermatologists

____ Doctor you see regularly

____ Other health professional (specify) _____

**PLEASE CONTINUE ON THE FOLLOWING PAGE**

WE WOULD LIKE TO KNOW SOME OF YOUR PERCEPTIONS ABOUT SKIN CANCER. FOR **EACH** OF THE FOLLOWING STATEMENTS PLEASE **CIRCLE ONE NUMBER**

36. Compared to other people of my age and gender, my chances of getting skin cancer in the future are:

much below average 1 2 3 4 5 6 7 much above average

Skin cancer is:

37.
not at all serious 1 2 3 4 5 6 7 extremely serious

38.
not at all easy to treat 1 2 3 4 5 6 7 extremely easy to treat

39.
not at all preventable 1 2 3 4 5 6 7 completely preventable

40.
not at all likely to happen to me 1 2 3 4 5 6 7 extremely likely to happen to me

41.
something I never think about 1 2 3 4 5 6 7 something I think about a lot

**THANK YOU FOR YOUR TIME**

# APPENDIX B

# PILOT TEST REACTION FORM

NOW THAT YOU HAVE COMPLETED THE SURVEY, PLEASE RESPOND TO THE FOLLOWING:

1. ARE THE SURVEY QUESTIONS UNDERSTANDABLE?

   Yes _____ No _____

   If your response is no, please share some suggestions

   _____

   _____

2. ARE THERE ANY SURVEY QUESTIONS THAT NEED FURTHER CLARIFICATION?

   Yes _____ No _____

   If your response is yes, please identify the question(s) # and share "why" the question(s) is/are confusing.

   _____

   _____

3. AT ANY TIME, WHILE TAKING THE SURVEY, DID YOU FEEL UNCOMFORTABLE?

   Yes _____ No _____

   If your response is yes, could you share what questions made you feel uncomfortable?

   _____

   _____

# APPENDIX C

# OUTLINE OF HYPOTHESES

**Hypothesis**: One
**Dependent Variable**: Knowledge of risk of artificial tanning devices (ATD's)
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Two
**Dependent Variable**: Knowledge of ATD's
**Level of Measurement**: Ordinal level data
**Independent Variable**: Grade Level (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Three
**Dependent Variable**: Reported behavior related to tanning salon use
**Level of Measurement**: Nominal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** chi-square test of independence

**Hypothesis**: Four
**Dependent Variable**: Reported behavior related to tanning salon use
**Level of Measurement**: Nominal level data
**Independent Variable**: Grade Level
**Statistical Test:** chi-square test of independence

**Hypothesis**: Five
**Dependent Variable**: Number of visits to a tanning salon
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis:** Six
**Dependent Variable**: Number of visits to a tanning salon
**Level of Measurement**: Ordinal level (2 independent samples)
**Independent Variable**: Grade Level
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Seven
**Dependent Variable**: Length of session at a tanning salon
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Eight
**Dependent Variable**: Length of session at a tanning salon
**Level of Measurement**: Ordinal level data
**Independent Variable**: Grade Level (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Nine
**Dependent Variable**: Reported Injury
**Level of Measurement**: Ordinal level data
**Independent Variable**: Reported length of session (3+ indep. samples)
**Statistical Test:** Spearman's rho

**Hypothesis**: Ten
**Dependent Variable**: Use of eye protection
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis:** Eleven
**Dependent Variable:** Use of eye protection
**Level of Measurement**: Nominal level data
**Independent Variable**: Grade Level (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Twelve
**Dependent Variable**: Reported visits to a doctor, dermatologist, or emergency room resulting from use of a tanning salon
**Level of Measurement**: Nominal level data
**Independent Variable**: Reported visits to a tanning salon (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis:** Thirteen
**Dependent Variable:** Perceived chance of getting skin cancer
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis:** Fourteen
**Dependent Variable:** Perceived chance of getting skin cancer
**Level of Measurement**: Ordinal level data
**Independent Variable**: Grade Level (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Fifteen
**Dependent Variable**: Reported number of visits to a tanning salon
**Level of Measurement**: Ordinal level data
**Independent Variable**: Perception of getting skin cancer (3+ independent samples)
**Statistical Test:** Spearman's rho

**Hypothesis**: Sixteen
**Dependent Variable**: Perception of seriousness of skin cancer
**Level of Measurement**: Ordinal level data
**Independent Variable**: Gender (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Seventeen
**Dependent Variable**: Perception of seriousness of skin cancer
**Level of Measurement**: Ordinal level data
**Independent Variable**: Grade Level (2 independent samples)
**Statistical Test:** Wilcoxon rank sum test

**Hypothesis**: Eighteen
**Dependent Variable**: Reported number of visits to a tanning salon
**Level of Measurement**: Ordinal level data
**Independent Variable**: Skin type (3+ independent samples)
**Statistical Test:** Spearman's rho

**Hypotheses 19-22:** Kolmogornov-Smirnov one sample test

**Hypothesis**: Twenty-three
**Dependent Variable**: Knowledge of risks of ATD's
**Level of Measurement**: Ordinal level data
**Independent Variable**: Perception of getting skin cancer in the future (3+ independent samples)
**Statistical Test:** Spearman's rho

**Hypothesis**: Twenty-four
**Dependent Variable**: Length of tanning session
**Level of Measurement**: Ordinal level data
**Independent Variable**: Perception of getting skin cancer in the future (3+ independent samples)
**Statistical Test:** Spearman's rho

**Hypothesis**: Twenty-five
**Dependent Variable**: Use of eye-protection
**Level of Measurement**: Ordinal level data
**Independent Variable**: Perception of getting skin cancer in the future (3+ independent samples)
**Statistical Test:** Spearman's rho