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Healthy Skin is In: Effects of a Multifaceted Sun Safety Program for Adolescents

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HEALTHY SKIN IS IN: EFFECTS OF A MULTIFACETED SUN SAFETY PROGRAM

FOR ADOLESCENTS

by

LINDSAY A. MUNDEN

EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

DOCTOR OF NURSING PRACTICE

2013

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DEDICATION

This project is dedicated to my father who has provided endless support during my academic endeavors and shaped the person I am today. You have encouraged me to strive higher than I could ever have imagined and your confidence in me provided the motivation necessary to continue on during my graduate studies. The older I get, the more I have realized just how much wisdom you hold and I am so thankful that you have shared so much of that with me. I know that as I start my own family I will have my experiences as a child to reflect upon. You have shown me what it means to work hard, make sacrifices, and to guide your children down the correct path. You have given so much to me, Dad, and there is no way I could ever repay that debt. Just know that I love you and appreciate everything that you have done to help pave the way for a lifetime of happiness for me.

To my husband, thank you for your inspiration, patience, and understanding during this doctorate journey. Our first year of marriage was certainly challenged with school obligations, deadlines, and countless absences from family events, but you were always sympathetic and reassuring that everything would be worth it in the end. You have been there for me even when I doubted myself, and your extra efforts for our family when my energy was lacking have not gone unnoticed. I love you and am the luckiest woman in the world to have such a genuinely kind and caring husband. In return, I promise to support you in all aspects of our life over the many years we have ahead. I look forward to spending more time together and growing as a family with the arrival of Baby Munden later this year!

To Drew, thank you for being so patient with your “Minnie” while I finished all of my “homework”. Your trips to visit me at the library, (even if they were to search for the Ghostbusters Slimer hidden in the bookshelves) brightened my day and gave me the motivation needed to complete the tasks at hand. You bring joy to my life.

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TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
DEDICATION.....	iii
ACKNOWLEDGMENTS.....	iv
TABLE OF CONTENTS	v-vi
LIST OF TABLES.....	vii
LIST OF FIGURES	viii
ABSTRACT.....	ix
CHAPTERS	
CHAPTER 1 – Introduction	1
CHAPTER 2 – Theoretical Framework and Review of Literature	10
CHAPTER 3 – Implementation of Practice Change	55
CHAPTER 4 – Findings.....	64
CHAPTER 5 – Discussion.....	85
REFERENCES.....	99
AUTOBIOGRAPHICAL STATEMENT.....	106
ACRONYM LIST.....	107
APPENDICES	
APPENDIX A – Evidence Data Table.....	109-123
APPENDIX B – Healthy Skin is IN Curriculum.....	124-130
APPENDIX C – Healthy Skin is IN PowerPoint Presentation.....	131-139
APPENDIX D – Parental Consent Form.....	140-141
APPENDIX E– Child Assent Form.....	142

APPENDIX F – Poster Competition Form.....	143
APPENDIX G – Follow-up Letter to Parents.....	144
APPENDIX H – School Policy Change Recommendations.....	145-147
APPENDIX I – Letter of Interest to Middle School Science Teachers.....	148-149
APPENDIX J – Teacher Approval Form.....	150
APPENDIX K – Letter of Interest to Parents.....	151-152
APPENDIX L – Pretest Survey.....	153-155
APPENDIX M – Content Validity Statement from Pediatrician.....	156
APPENDIX N – Post-test Survey Form 1.....	157-158
APPENDIX O – Post-test Survey Form 2.....	159-160
APPENDIX P – Survey Code Sheet.....	161-176

LIST OF TABLES

<u>Table</u>	<u>Page</u>
Table 4.1 Demographics of Sample Characteristics.....	72-73
Table 4.2 Self-Reported Behaviors over Previous Summer Season.....	74
Table 4.3 Comparison of Knowledge, Attitudes, and Behavioral Intent Mean Scores Before and After the Intervention.....	76
Table 4.4 Comparison of Participants' Knowledge Scores Before and After the Intervention According to the Question.....	77-78
Table 4.5 Frequencies for Select Sample Characteristics on Total Knowledge Scores.....	79
Table 4.6 Comparison of Participants' Attitudes Before and After the Intervention According to the Question.....	80
Table 4.7 Frequencies for Select Sample Characteristics on Total Attitude Scores.....	83
Table 4.8 Frequencies for Select Sample Characteristics on Total Behavior Scores.....	84
Table 4.9 Comparison of Participants' Behavioral Intentions Before and After the Intervention According to the Question.....	85

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
Figure 4.1 Self-Reported Skin Type Pie Chart.....	71
Figure 4.2 Histogram Comparison Showing the Distribution of Knowledge Scores Between Pre-test, Post-test 1, and Post-test 2	75
Figure 4.3 Histogram Comparison Showing the Distribution of Attitude Scores Between Pre-test, Post-test 1, and Post-test 2.....	81
Figure 4.4 Histogram Comparison Showing the Distribution of Behavior Scores Between Pre-test, Post-test 1, and Post-test 2.....	82

ABSTRACT

Skin cancer is a common, potentially life threatening disease notably on the rise among young Americans. A substantial portion of lifetime exposure to ultraviolet (UV) radiation, the greatest modifiable risk factor for skin cancer development, occurs during childhood and adolescence. Schools infrequently integrate sun safety education into the classroom and many lack essential sun safety policies. The purpose of this EBP project was to implement a multifaceted educational intervention providing middle school students with the knowledge and behavioral skills needed to minimize the risk of developing skin cancer. The Health Belief Model and ACE Star Model of evidence-based practice guided this project. A convenience sample of seventh and eighth grade science students attending a local middle school in Northwest Indiana during the fall of 2012 were recruited. Interventions included two 50-minute educational sessions utilizing PowerPoint, video-clips, nurse practitioner led discussion, in-class group activities focusing on the impact of UV radiation, and appearance-focused evaluations with a skin viewing device. Informational packets for parents and school policy recommendations for administrators were developed and distributed. Questionnaires were administered to participants immediately before, immediately following, and one month following implementation of the project. Three major outcomes were evaluated: knowledge of sun safety, intentions to practice sun-protective behaviors, and attitudes toward sun-protection. While 169 students received the educational component of the program, only 125 students ages 12-14 years ($M = 12.8$) participated in the completion of all three questionnaires. The project demonstrated significant improvements in students' knowledge on sun safety and UV radiation ($p < .001$), attitudes toward tanning and skin cancer ($p < .001$), and self-reported intentions to change sun-protective behaviors ($p < .001$). Improvements were maintained over time from pre-test to post-test two. School nurses, administrators, and community leaders can use findings from this project to initiate policy revisions supporting a sun safe environment and the implementation of sun safety education across all grade levels.

CHAPTER 1

INTRODUCTION

Background

Skin cancer is currently the most prevalent type of cancer in the United States (U.S.), with annual incidence rates steadily rising (Centers for Disease Control and Prevention [CDC], 2011). “Currently, one in five Americans will develop some form of skin cancer in their lifetime, and since the early 1970s the incidence of skin cancer has increased by as much as 4% in the U.S.” (World Health Organization [WHO], 2003, p. 1). “Overall, skin cancers affect more people than lung, breast, colon, and prostate cancers combined” (Indiana Cancer Consortium [ICC], 2011, p. 46).

Although the two most common forms of skin cancer, basal cell and squamous cell carcinoma, are highly curable, over 3.5 million cases are diagnosed each year (American Cancer Society [ACS], 2012b). In contrast, the third type of skin cancer, melanoma, accounts for less than 5% of skin cancer diagnoses, but has been associated with higher morbidity and mortality (ACS, 2012a). “The overall lifetime risk of getting melanoma is about 1 in 50 for whites, 1 in 1,000 for African Americans, and 1 in 200 for Hispanics” (ICC, 2011, p. 46). Yet, although the overall 5 year survival rates for melanoma approach 91% if detected early, treatment often involves life altering procedures such as radiation, chemotherapy, and disfiguring surgeries (ACS, 2012a; Bird, 2011). Furthermore, in those with more advanced disease at the time of diagnosis, melanoma has a high mortality rate, accounting for the vast majority of skin cancer deaths, killing approximately one American every hour (ACS, 2012a). Unfortunately, the incidence of this potentially life threatening form of skin cancer has been increasing more rapidly than any other type of cancer and has been noted to be on the rise nationally in those under the age of 30 (ICC, 2011). In fact, melanoma is identified as the second most common cancer of women in their 20s and the third most common cancer of men in their 20s (Wu et al., 2005).

The rise in melanoma incidence among young people may be contributed to interrelated factors: (a) the decrease in the earth's protective ozone layer, (b) a change in pattern of dress favoring more skin exposure, (c) more opportunities for leisure activities in sunny areas, and (d) an increase in exposure to artificial sources of ultraviolet (UV) radiation for tanning purposes (American Academy of Pediatrics [AAP], 2011). The common thread within these three factors is UV radiation exposure. UV radiation exposure causes skin cells to lose their ability to divide and grow normally. Erythema and sunburn are acute reactions to UV radiation, while premature aging of the skin and wrinkles are noted as chronic reactions from UV exposure (AAP, 2011). "Up to 90 percent of visible changes to the skin commonly thought to be caused by aging are actually caused by sun exposure" (Glanz, Saraiya, & Wechsler, 2002, p.3). Yet, even more problematic is the devastating impact of excessive UV exposure that contributes to malignancies that develop in the epidermis, dermis, or the adnexal structure of the skin (Maguire-Eisen, Rothman, & Demierre, 2005). Excessive exposure to UV radiation from the sun or other sources, e.g. tanning beds, has been identified as the greatest risk factor for developing skin cancer (ACS, 2012b). Because of this link, UV radiation has now been classified as a known human carcinogen by the U.S. Department of Health and Human Services [USDHHS] (2011), joining the ranks of other known cancer causing substances such as tobacco, arsenic, and radon (Kamell et al., 2011). Although high levels of UV radiation increases the risk of all three forms of skin cancer, this radiation exposure more importantly has been linked to the development of approximately 65 to 90% of all melanomas (Glanz, Saraiya et al., 2002).

Despite the fact that children are not commonly diagnosed with skin cancer, it is during childhood and adolescence that a substantial proportion of lifetime exposure to UV radiation occurs (CDC, 2009). Children generally spend more time outdoors and have greater opportunities for sun exposure than adults, and thus have more opportunities to increase their risk of developing skin cancer. Approximately 80% of a person's lifetime sun exposure and resulting skin damage occurs before 18 years of age (Stern, Weinstein, & Baker, 1986). Experts

also agree that the occurrence of one or more blistering sunburns during childhood and adolescence has not only been linked to the development of skin cancer, but may actually double the lifetime risk of developing melanoma (Environmental Protection Agency [EPA], 2003; Saraiya et al., 2004) Not surprisingly, overexposure to UV radiation and blistering sunburns are still common among children in the U.S. today. Reported sunburn incidence among American children remains extremely high, ranging from 29% to 83% for the previous summer season (Geller et al., 2002). Overexposure may not arise simply from outdoor activities; the CDC (2012) noted that 9% of teens aged 14 to 17 years reported having used indoor tanning devices.

Given the rising skin cancer rates and persistent UV exposure, it is not surprising that skin cancer has been categorized by the CDC as an epidemic, becoming recognized as a serious nationwide health problem affecting people of all ages, races and ethnicities. This epidemic has gained the interest of many organizations that aim to improve health behaviors (CDC, 2011). Within Healthy People 2020, the USDHHS (2012) identified UV light exposure as a preventable risk factor in the reduction of cancer cases in the U.S. Clearly, exposure to UV radiation is a potentially modifiable risk factor that plays an important role in the future development of skin cancer. Patterns of sun exposure during early life impact the subsequent risk of skin cancer development into adulthood (Geller et al., 2002). Yet, national surveys indicate that U.S. youth and adults are still frequently being exposed to UV radiation and can do more to protect themselves (CDC, 2012). Therefore, targeting children early in life with sun protective education is crucial to the promotion of sun safe practices that are designed to ultimately reduce skin cancer prevalence across all populations.

Statement of the Problem

Despite national efforts raising awareness on the harmful effects of UV radiation exposure, more than one-third of the U.S. population has reported experiencing a sunburn in the previous year, and skin cancer rates have continued to rise exponentially (CDC, 2012).

Many health and environmental organizations have identified a need to develop new strategies

to protect against skin cancer, especially among children and adolescents (American Skin Association [ASA], 2012; CDC, 2009; EPA, 2003; Skin Cancer Foundation [SCF], 2012). Comprehensive sun protection programs may enhance awareness of the health risks associated with UV radiation and alter behaviors to reduce the prevalence of skin cancer (Glanz, Saraiya, et al., 2002). Sun exposure preventive behaviors can yield the most positive effects if they are initiated early and established as healthy and consistent patterns throughout life (Fulmore, Geiger, Werner, Talbott, & Jones, 2009).

Because much time during childhood and adolescence is spent at school, this setting provides a favorable environment in which to teach and model healthy sun related behaviors (CDC, 2009). There are approximately 50 million students attending more than 98,000 schools nationwide, providing easy access to the large majority of today's youth (U.S. Department of Education, 2008). However, schools infrequently provide sun protection activities and many lack sun safety policies. According to a CDC (2001) study, only 13 of 50 states in the U.S. offered sun safety education in elementary schools, and only 16 offered sun safety education in secondary schools. Yet opportunities abound to teach about sun protective education across all curricular settings (Fulmore et al., 2009). "As schools face many issues in attempting to keep students safe and creating an environment in which they are protected and encouraged to excel, skin cancer prevention initiatives are often designated as low priority compared with issues such as violence, substance abuse, and proper nutrition" (Geller, Rutsch, Kenausis, Selzer, & Zhang, 2003, p. 98). School programs can play a critical role in educating young people about their health and ensuring that they have a healthy environment when they are engaged in school activities (CDC, 2009).

The CDC issued "Guidelines for School Programs to Prevent Skin Cancer" in 2002 to promote prevention related activities in school environments (Glanz, Saraiya et al., 2002). The report highlighted major principles that could be utilized to effect sun protective changes within school settings (Hart & DeMarco, 2008). Since the release of this guideline, both primary and

secondary school-based sun safety programs have been successfully implemented across the nation with improvements in knowledge, and in some instances, behaviors, related to sun protection among children and adolescents (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Hart & DeMarco, 2008; Irwin, Mauriello, Hemminger, Pappert, & Kimball, 2007; Kyle et al., 2008; Olson, Gaffney, Starr, & Dietrich, 2008; Olson et al., 2007; Reynolds, Buller, Yaroch, Maloy, & Cutter, 2006; Townsend et al., 2011). Effective school-based sun safety programs implemented across the nation have provided substantial evidence to support the need for interventions at the local level.

Clinical Agency Data

Middle school is an especially important time to provide sun safety education, since adolescents are beginning to take responsibility for their health and establish their own lifetime health habits (CDC, 2009). Adolescence is a period for steady decline in sun safe practices and increased use of indoor tanning lights (Olson et al., 2007). This age group is also highly influenced by peers and social media which portray to teens that a tan is attractive and healthy for the skin (Olson et al., 2007). Adolescents are at an impressionable age in which sun protective behaviors can be adapted and school-based programs can be an effective means to reach this concerning population.

A local middle school serving grades six through eight in the Metropolitan School District of Boone Township was selected as the setting for this evidence-based practice (EBP) project. The school principal approved this project, and the school nurse served as the site facilitator. The desire of the school “is to provide challenging academic opportunities in a warm and supportive school climate, be sensitive to the unique developmental needs of middle level students, and provide every student with high-quality teachers, resources, and support” (H Middle School, 2012). Implementation of the sun safety program, Healthy Skin Is IN, was directly in line with the project site’s mission statement. Furthermore, formal education related to

sun safety within this corporation was lacking and the facility recognized the importance and need for such an intervention (school nurse, personal communication, May 18, 2012).

According to the most recent data, there was a total enrollment of 249 students within this educational setting, 83 students in sixth grade, 87 students in seventh grade, and 79 students in eighth grade (Indiana Department of Education, 2012). The proportion of enrollment by ethnicity was 84.3% white, 9.2% Hispanic, 3.2% black, and 3.2% multiracial (Indiana Department of Education, 2012). In educational settings, free and reduced lunches are a good indicator of socioeconomic status within a student population (local school principal, personal communication, July 8, 2012). At the middle school selected for this project, the reflection of socioeconomic status based on the number of free or reduced meals was 18.5% free meals, 6% reduced meals, and 75.5% paid lunches (Indiana Department of Education, 2012). The proportion of paid lunches at the project site was high in comparison to the state average of 53% of paid student lunches (Indiana Department of Education, 2012). The percentage of free and reduced meals was low in comparison to the state average of 39% and 7.8% respectively (Indiana Department of Education, 2012). These statistics may indicate a higher level of socioeconomic status among the middle school population when compared to the state demographics. This is an important consideration prior to implementation of this project because some experts have correlated a higher socioeconomic status with increased incidence of skin cancer disease burden (Hausauer, Swetter, Cockburn, & Clarke, 2011).

As is the case for most school systems, the pressure to teach state standards and produce exceptional student test scores on national exams at the project site was pronounced. The delivery of educational programs within the classroom by outside sources had been faced with resistance by some teachers, however others embraced such opportunities if the curriculum could be adapted to address specific state standards for that course (school nurse, personal communication, May 22, 2012). Prior to project implementation, curricula and/or school policies on sun safety within this educational setting did not exist, although teachers

acknowledged the value of this content (school nurse, personal communication, May 22, 2012). Thus, sun safety education incorporated into existing classroom curriculum was key to the success of this EBP project. It was also important to consider that only 25% of students rotated through health class during the fall 2012 semester at this middle school site (school nurse, personal communication, May 22, 2012). But, implementing the intervention in science class afforded the opportunity to capture all students, with the exception of those in sixth grade, because the health and science teachers at the sixth grade level decided not to participate (school nurse, personal communication, May 22, 2012). Healthy Skin is IN was successfully implemented as a result of collaboration between all stakeholders including the school nurse, principal, science teachers, and project coordinator.

Purpose of the Evidence Based Practice Project

Evidence has demonstrated that skin cancer is a national concern, especially among children and adolescents, and sun safety education has been currently lacking among many school systems across the nation. The purpose of this EBP project was to implement a multifaceted educational intervention using a synthesis of current evidence to provide middle school students with the knowledge and behavioral skills needed to minimize the future risk of developing skin cancer. The program titled, Healthy Skin is IN, examined the effects of a multifaceted sun safety program on the knowledge, attitudes, practices, and intended sun-protective practices of middle school students. Hence, the compelling clinical question that initiated this EBP project was as follows: What is the effect of sun safety education on children's knowledge and behaviors related to sun protection? The aims of the project were to increase students' knowledge and enhance the use of sun safe behaviors to ultimately reduce the future risk of developing skin cancer. The PICOT (i.e., patient population, intervention of interest, comparison intervention or status, outcome, and timeframe) format was used to guide the project and facilitate the retrieval of the best available evidence. The following PICOT question was developed: For middle school children, does the use of a multifaceted sun safety program

positively impact knowledge, attitudes, and/or intentions to practice sun protective behaviors over a four week period, as compared to the knowledge level, attitudes, and sun protective behaviors within these children prior to the sun safety program?

Significance of the Project

Skin cancer is a common, potentially life threatening disease that is notably on the rise among young people in the U.S. This EBP project seems well-timed considering a recent poll of 484 school principals revealed that 96% of those surveyed were “interested in obtaining a sun safety curriculum” (Buller, Buller, & Reynolds, 2006). Education on the risks of UV radiation can help children develop the knowledge, attitudes, values, and skills that are needed to make positive sun safe decisions. Experts in the field of education and health care have collaborated to create fun and informative programs that teach sun protection to children and adolescents (Maguire-Eisen et al., 2005). Many of these programs are available free of cost and can be adapted or modified for application in certain age groups within the community (Maguire-Eisen et al., 2005). Educational sun safety programs have indicated that important knowledge can be acquired, attitudes modified, and intentions to change behavior promoted, when implemented during childhood and adolescence (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kyle et al., 2008; Olson et al., 2008; Olson et al., 2007).

This EBP project sought to provide additional depth to the current body of knowledge regarding middle school-based sun safety programs for adolescents. The results may provide valuable information to school nurses, educators, administrators, health care providers, school associations, and health organizations. School systems may use the findings as an impetus to revise policies to support sun safe behaviors in the school environment and mandate the implementation of sun safe education across all grade levels. The program was designed to increase the awareness, knowledge, and application of sun safe behaviors by adolescents and their family members. Teacher and parental sun safe role-modeling may also improve following this program as a result of exposure to sun safety posters and take home informational packets.

Results may be used by other advanced practice nurses (APNs) to facilitate school-based interventions aiming to increase sun-related knowledge and behaviors, which ultimately impact the future incidence of skin cancer.

CHAPTER 2

THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

Theoretical Framework

One of the first theories on health behavior, the Health Belief Model (HBM), was used to guide this EBP project. The HBM was developed in the 1950s as a means to explain why medical screening programs offered by the U.S. Public Health Service, particularly those focusing on tuberculosis screening, were unsuccessful (Hochbaum, 1958). The HBM is a psychological model that attempts to explain and predict health behaviors focusing on the attitudes and beliefs of individuals (Glanz, Rimer, et al., 2002). The underlying concept of the HBM is that health behavior is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence (Hochbaum, 1958). Over the years, researchers have expanded on this theory, concluding that six main constructs influence people's decisions about whether to take action to prevent, screen for, and control illness (National Cancer Institute [NCI], 2003). Within the HBM, people are identified as ready to act if they (a) believe they are susceptible to the condition (*perceived susceptibility*), (b) believe the condition has serious consequences (*perceived severity*), (c) believe taking action would reduce their susceptibility to the condition or its severity (*perceived benefits*), (d) believe costs of taking action (*perceived barriers*) are outweighed by the benefits, (e) are exposed to factors that prompt action (*cue to action*), and (f) are confident in their ability to successfully perform an action (*self-efficacy*) (NCI, 2003).

The HBM has been applied to a broad range of health behaviors and populations within nursing practice and was an ideal framework for guiding this EBP project. Healthy Skin is IN focused on health-related practice change (sun safety) to aid in the reduction of future disease incidence (skin cancer). Project efforts were grounded in an understanding of whether adolescents (a) perceived that they were likely to develop skin cancer, (b) believed that skin

cancer was serious or life threatening, and (c) believed that the adoption of sun safe practices could reduce future risk of skin cancer development at an acceptable cost (NCI, 2003).

Perceived susceptibility, beliefs about the chances of getting a condition, was examined in this project by evaluating students' beliefs about their chances of getting skin cancer. Researchers have stated that adolescent invulnerability may lead to attitudes that skin cancer is a remote, adult problem (Olson et al., 2007). Thus, adolescents could be less inclined to move toward a positive health-related action if they perceived their likelihood of developing the disorder as low. In contrast, if adolescents were educated about their true susceptibility to skin cancer, and the rising incidence among younger populations, they may be more likely to adapt sun safe behaviors.

Perceived severity, beliefs about the seriousness of a condition and its consequences, was examined by evaluating students' knowledge on the effects of sun exposure and skin cancer. Of importance, were students' beliefs on the severity of skin cancer and whether they perceived skin cancer as life-threatening. Marked improvements in knowledge variables have been noted among students participating in previous sun safety school-based programs, which were a key measure in this project as well (Geller, Rutsch, Kenausis, Selzer, & Zhang, 2003). If students were provided with education on skin cancer severity and developed a perception of skin cancer as a serious condition, they may be more likely to adapt sun-protective behaviors. If the APN failed to provide the proper insight on the severity of skin cancer and teens continued to dismiss this condition as a threat, they may be less likely to adapt the desired/intended behavior change.

Perceived benefits, beliefs about the effectiveness of taking action to reduce risk, were measured by assessing students' attitudes towards tanning. Experts have reported that when children approach adolescence, their suntan appreciation increases (Hughes, Altman, &

Newton, 1993; Pion et al., 1997). Therefore, the APN presumed that greater effort was needed to achieve an attitudinal or perceived benefit change among the targeted age group for this EBP project. Sun safety education, inclusive of a discussion on the social desirability of tanning, has the potential to overcome the misperceived benefit that a tan is healthy. An understanding of the short term outcomes (sun burn, tanned appearance) and long term outcomes (premature aging, skin cancer) from exposure to UV radiation during childhood and adolescence could alter students' perceived benefits of sun-protective practices.

Perceived barriers, beliefs about the material and psychological costs of taking action, was measured with sun related attitudes and behaviors adopted during the EBP project. Failure to use sun-related behaviors (i.e., application of sunscreen, use of protective clothing, avoidance of the sun between 10 a.m. and 4 p.m.) assisted in identifying perceived barriers among this population. Obtaining a tan, regardless of the risk, to gain acceptance among peers was anticipated to be a perceived barrier to sun protective practices. Geller et al. (2002) reported that 49% of adolescents who had sustained more than one sunburn over the previous summer season agreed it was worth burning to get a tan. Common misperceptions that a tan is healthy and attractive and that tanning beds are safe were addressed during this EBP project. An effort to overcome perceived barriers to using sun-protection was of essence to project success.

The remaining constructs, *cues to action* and *self-efficacy*, were also addressed within this EBP project. *Cues to action*, factors that activate readiness to change, transpired in the form of the multifaceted sun safety educational interventions for this EBP project. Interventions included nurse practitioner-led presentations incorporating in-class UV radiation and appearance-focused activities for middle school students. *Self-efficacy*, the confidence in one's ability to take action, was reinforced with school policy recommendations, family involvement, and community awareness initiatives.

Selection of the HBM as the theoretical framework for this EBP project was a rational decision given the project's underlying goal to increase knowledge on sun safety and promote sun safe behaviors. Project efforts aimed to increase students' knowledge (*perceived susceptibility* and *perceived severity*), attitudes (*perceived benefits*), and behaviors (*perceived barriers*) to motivate change (*cues to action* and *self-efficacy*) toward a healthier future. The model has been commonly used to guide healthcare providers and organizations whose efforts focus on health promotion and disease prevention, further demonstrating its applicability. Adolescence, a time when children are exploring their independence and developing a sense of self, provided a receptive age for behavioral change. Hence, the constructs of the HBM were easy to comprehend and apply to this population. The feasibility between the models' key constructs and the outcome measures in this project made the model an ideal framework for implementation.

A limitation to the use of the HBM as a framework which guided this EBP project was the potential to cause unnecessary fear or worry (*perceived susceptibility* or *perceived severity*) in regards to the students' risk of developing skin cancer. An unintended consequence of educating adolescence about the effects of UV radiation exposure and the severity of skin cancer was that their perceptions and/or behaviors could be altered to the extreme. Steps were taken to assure the participants in this project of the realities of the disorder and the appropriate practices to minimize the risk of future disease burden, while limiting the potential for hysteria. Another limitation to using the HBM within this study was the limited time-frame for project implementation. Behavioral change was difficult to measure over the short period of time allotted for this project; therefore intentions to change behavior, as utilized in prior school-based programs, was the primary emphasis. Prospective follow-up projects may be needed to demonstrate whether knowledge change is persistent and whether the program can alter behaviors over time.

Evidence-Based Practice Model

In addition to the HBM, the Academic Center for Evidence-based Practice (ACE) Star model was used to guide the development of this EBP project. The ACE was established as a Center of Excellence for the University of Texas Health Science Center at San Antonio in January 2000 (ACE, 2012). The purpose of ACE is to bridge research into practice with the ultimate goal of improving care, patient outcomes, and patient safety (ACE, 2012). The ACE Star model provides a detailed framework with which to organize and implement EBP processes and approaches (Melnyk & Fineout-Overholt, 2005). The model uses a five-point star to illustrate the five major stages of knowledge transformation (Melnyk & Fineout-Overholt, 2005). These stages are (a) knowledge discovery, (b) evidence summary, (c) translation into practice recommendations, (d) implementation into practice, and (e) evaluation (Stevens, 2004). “The Star Model depicts various forms of knowledge in a relative sequence, as research evidence is moved through several cycles, combined with other knowledge and integrated into practice” (Stevens, 2004).

Within the ACE Star model, point one on the star identifies the discovery stage, in which EBP projects are initiated (Stevens, 2004). Discovery is when new knowledge is generated by research methodologies used in traditional, single, or original research studies (Stevens, 2004). For purposes of this project, the APN initially reviewed single studies, later described in the *literature search*, which evaluated the impact of sun safety education. This led to the discovery that school-based sun safety programs exist and have been successfully implemented across the nation. Yet, findings from these single studies indicated that many schools have not been providing sun safety education, even though the importance of sun safety awareness for children has been nationally recognized. Thus, the decision to move forward and further evaluate all studies on the topic of sun safety school-based programs emerged. Following the

review of individual studies, the project coordinator progressed to the second point on the ACE Star model.

Point two on the ACE Star model represents the stage of evidence summary, which is unique to EBP (Melynk & Fineout-Overholt, 2005). During this stage, evidence from all research knowledge is synthesized into a single meaningful statement of the state of science (Stevens, 2004). Evidence summaries are portrayed in various forms of literature reviews and examples include those commonly referred to as systematic reviews, evidence syntheses, integrative reviews, and meta-analyses (Stevens, 2004). Within this EBP project, the *synthesis of appraised literature* served as the evidence summary described in point two on the ACE Star model. Evidence synthesis on school-based sun safety education programs guided the interventions utilized during the implementation of this project.

Translation, or point three on the ACE Star model, culminates in an evidence summary combined with clinical expertise, to produce valid and reliable clinical recommendations (Stevens, 2004). “At this stage of transformation, the knowledge now reflects best practice based on best research evidence and consensus and endorsement of experts” (Melynk & Fineout-Overholt, 2005, p. 424). The *best practice model* within this doctoral report depicts the translation of the best available evidence on school-based sun safety programs. Clinical guidelines on school-based sun safety programs, developed by key stakeholders such as the CDC and the WHO, exemplify the expert endorsements which directed this EBP project. The ACE Star model summarizes that research evidence is contextualized to a specific client population and setting (Stevens, 2004). Therefore, the best practice model developed for use in this project targeted adolescents within a local middle school setting.

Integration of the EBP, the fourth point of the ACE Star model, entails implementing research into practice (Stevens, 2004). This step is perhaps the most familiar stage to APNs

because of society's long-standing expectation that healthcare be based on the most current available knowledge (Stevens, 2004). Healthy Skin is IN proposed to integrate the most current best available evidence on sun safety education for middle school students. At this stage of the model, important considerations, such as cost efficiency, timeliness, and usefulness for the clinician and client are critical (Melynk & Fineout-Overholt, 2005). The APN integrating this project aimed to make the sun safety school program timely, cost effective, and meaningful for all participants including students, teachers, and administrators. Implementation occurred during regularly scheduled class time and the delivery of information was in a format which addressed state standards for both science and health curricula.

Evaluation is the fifth and final stage identified in the ACE Star model of knowledge transformation (Stevens, 2004). Evaluation of this project was conducted by means of a pretest-posttest survey questionnaire measuring students' knowledge, attitudes, sun-related practices, and intentions. As knowledge was transformed through the five stages of the ACE Star model during this EBP project, the final outcome ultimately promoted the health of individuals by reducing the future risk of skin cancer. Findings from this project were disseminated in both narrative and oral format by means of posters, presentations, and publications.

Literature Search

A search for relevant literature was initiated to identify and summarize the best available evidence relating to school-based sun safety programs for adolescents. The database sources examined include CINAHL, MEDLINE via EBSCO, Proquest Nursing and Allied Health Source, Joanna Briggs Institute, Cochrane Library, National Guideline Clearinghouse, ERIC, and PsycINFO. Meetings with the Valparaiso University research services and health sciences librarian were conducted for assistance in narrowing search terms. The MeSH (medical subject heading terms) system was used in the literature search for this project to ensure consistency.

Initial key words used in the literature search included skin cancer, skin cancer prevention, program, sun awareness, sun protection, sun safety, adolescents, schools, teenagers, and intervention. After refining the literature search with the university librarian, the final combination of key words, phrases, and search terms utilized include “skin cancer” OR “sun awareness” OR “sun protection” AND prevention OR program OR intervention OR education OR SunWise OR SunSafe OR Kidskin OR SunAWARE OR “SPF Kids Program” OR “Sunny Days Healthy Ways” OR SunSmart OR “Slip Slap Slop” OR Raybusters OR “Together for Sun Safety” OR “Appearance focused skin cancer prevention intervention” OR “Sun Protection for Florida’s Children” OR “You can still be HOT in the shade” AND school* OR adolescent* OR teen* OR child*. Search terms were reviewed within the abstracts of all databases using the same key phrases.

Abstracts were obtained for review if they were (a) peer reviewed, (b) written in English, (c) published within the last ten years, (d) incorporated school-based interventions, and (e) included adolescents ages 11-14. Abstracts were excluded from review for the following reasons, the article (a) solely provided descriptive background information on skin cancer, behaviors, attitudes, or knowledge; (b) focused on policy change within school systems; (c) focused on the use of tanning devices; (d) solely implemented interventions in recreational settings such as pools, zoos, parks, etc.; (e) evaluated risk factors for skin cancer; (f) evaluated current treatment approaches for skin cancer; (f) implemented interventions solely in preschool, elementary, high-school or daycare settings; (g) utilized interventions that were specifically targeted toward parents, the community, or primary care providers; (h) utilized interventions over the summer season; (i) was described as a pilot, study protocol, or proposal; or (j) evaluated findings from a single school-based program already retrieved as evidence for this review. Articles with any of these topics as a focus were excluded because of limited applicability to the targeted population or intervention of interest. The selection of articles

reporting on the same school-based intervention were limited for inclusion as evidence, dependent on the outcomes measured and applicability to the project. Articles published outside of the U.S. were not excluded from the initial literature search because many nations have preceded the U.S. in providing valuable sun safety education programs to youth.

Upon a full review of the abstracts and elimination of duplicate citations within all searched databases, a total of 15 articles were deemed appropriate for use as evidence within the EBP project. Relevant articles were retrieved in the following manner. When searching within CINAHL, there were a total of 62 abstracts, with seven articles meeting the criteria for inclusion in the project. Medline via EBSCO yielded 144 initial abstracts, with a total of five articles ultimately included as evidence for the project. The search within the Proquest database resulted in 47 abstracts, with four useful to the project, all of which were duplicate citations from previously generated searches. Additionally, non-nursing databases such as those focusing on education and psychology were reviewed for relevance. Searching within ERIC yielded 16 abstracts, four of which were applicable, but duplicate citations retrieved in the previous database searches. While searching within PsycINFO generated 43 abstracts, the six applicable articles were duplicate citations retrieved during previous database searches. When searching within the Joanna Briggs Institute and the National Guideline Clearinghouse with the terms “skin cancer” and “school”, there were no articles found useful for inclusion. Two abstracts were discovered when searching within the Cochrane database using the search terms skin cancer, prevention, program, school, adolescent, child*, and teen*. However, these abstracts did not meet the criteria for inclusion in the project. Thorough database searches resulted in evidence in the form of peer-reviewed, evidence-based clinical practice guidelines, randomized controlled trials (RCTs), literature reviews, systematic reviews, qualitative, and descriptive studies. Furthermore, three chased citations providing expert opinions from the U.S. Preventive Services

Task Force (USPSTF) and the SKF, and one clinical guideline from the WHO on school-based sun safety programs were included as evidence to guide the EBP project.

Appraisal of Relevant Evidence

The Agency for Healthcare Research and Quality [AHRQ] (2003) task force's grade definitions and Melnyk & Fineout-Overholt's (2005) rating system for hierarchy of evidence was utilized to critically appraise each piece of evidence. Fifteen pieces of evidence were included for the final appraisal: one systematic review (Level I), two clinical practice guidelines (Level I), five RCTs (Level II), one literature review (Level V), one qualitative case study review (Level V), three single descriptive studies (Level VI), and two expert opinions (Level VII). A summary of evidence from Levels I to VII is included within Appendix A.

Level I evidence.

Glanz, Saraiya, et al. (2002) reviewed scientific literature regarding the rates, trends, causes, and prevention of skin cancer and presented guidelines for schools to implement a comprehensive approach to preventing skin cancer. The report was one of a series of guidelines produced by the CDC to help schools improve the health of young persons by promoting behaviors to prevent the leading causes of illness and death. The guideline report did not indicate the search methodology or rating system utilized during the interpretation of evidence. Furthermore, the description of search methods and databases reviewed was not included. The guidelines were developed by the CDC in collaboration with specialists in dermatology, pediatrics, public health, and education; national, federal, state, and voluntary agencies; schools; and other organizations. CDC funding and support for development of the guideline was evident; however, no reporting of potential biases through the supportive agency were identified. The guideline was developed in response to studies indicating that protection from UV exposure during childhood and adolescence reduces the risk for skin cancer. The

CDC's guidelines have included seven recommendations for schools from prekindergarten through the twelfth grade to encourage skin cancer prevention. The authors failed to include a description of the methods used to formulate the CDC's recommendations. Based on a review of research, theory, and current practice, recommendations were included for schools to reduce skin cancer risks through (a) development of policies; (b) creation of physical, social, and organizational environments that facilitate protection from UV rays; (c) education of young persons; (d) development of professional staff; (e) involvement of families; (f) implementation of health services; and (g) evaluation of program outcomes.

The primary audience for the Glanz, Saraiya et al. (2002) report included state and local health and educational agencies and nongovernmental organizations concerned with improving the health of U.S. students. Materials presented throughout the guideline could be used to translate information into materials and training programs for constituents. At a local level, teachers and other school personnel, health service providers, community recreation program personnel, policymakers, and parents could use the guidelines to plan and implement skin cancer prevention policies and programs. Although, the guidelines have been intended for schools, they could also be used as a guide in child care facilities and other organizations that provide opportunities for children and adolescents to spend time outdoors. Unfortunately, there was no documentation of the guideline being piloted or pre-tested prior to its publication, and the methods for review and updating the guideline were not reported. But, the recommendations within the guideline were clear, concise, and numbered for easy review. Additionally, the evaluation section of the guideline provided criteria for monitoring the outcomes of school programs implemented across the nation to prevent skin cancer. Therefore, the evidence within this guideline provided significant support for this EBP project.

Saraiya et al. (2004) presented the results from a systematic review of research evaluating the effectiveness, applicability, other harms or benefits, economic evaluations, and

barriers to use of selected interventions to prevent skin cancer by reducing exposure to UV radiation. By using an electronic search within MEDLINE, PsycINFO, and CINAHL, articles were included if they (a) evaluated a specified population-based intervention for the prevention of skin cancer; (b) were published in English from 1996 to June 2000; (c) involved primary prevention of skin cancer; and (d) evaluated effectiveness and assessed at least one of the outcomes specified on the team's analytic framework. Articles were also included if (a) the researchers/authors provided information on one or more of the following: applicability, other effects, economic evaluation, or barriers to intervention implementation; (b) they were conducted in an established market economy; and (c) they were a primary study rather than a guideline or review. Studies of effectiveness or applicability required that the study compare a group of people exposed to the intervention with a group who had not been exposed or who were less exposed. The reviews were produced by the systematic review development team and a multidisciplinary team of specialists and consultants representing a variety of perspectives on cancer prevention. The team's study design classifications were chosen to ensure consistency in the review process. Studies with good or fair quality of execution, and any level of design suitability, were included in the body of evidence. The quality of study execution was assessed using *Community Guide* methods.

Saraiya et al. (2004) organized interventions for review into (a) individual-directed strategies, (b) environmental and policy interventions, (c) media campaigns, and (d) community-wide multicomponent interventions. The team further organized the most individual-directed strategies by the setting in which they were conducted. Of interest to this EBP project were the interventions focusing on educational policy and primary schools, although interventions in other educational, occupational, and recreational settings were evaluated. Saraiya et al. (2004) identified 33 reports on the effectiveness of educational and policy interventions in primary schools. Studies were conducted in diverse geographical locations, including Arizona, North

Carolina, Australia, Canada, and France. Most of the studies were conducted among a predominately white population. A wide range of intervention activities were used, including (a) didactic classroom teaching, (b) didactic teaching using sunscreen samples, (c) interactive class and home-based activities, (d) health fairs, (e) an educational picture book, (f) teaching by medical students, (g) interactive CD-ROM multimedia programs, and (h) peer education. The intervention methods evaluated within this systematic review were similar to those used in this EBP project.

The overwhelming majority of intervention studies examined within Saraiya et al. (2004) showed a significant increase in knowledge (22 out of 25) and a significant change in attitude (13 out of 17). Only four researchers evaluated intentions, and their findings were inconsistent in direction and generally not statistically significant. Specific sun-protective behaviors included (a) covering up (wearing hats, long- sleeved clothing, or pants); (b) using sunscreen; (c) avoiding the sun (seeking shade, rescheduling activities, not going out in the sun during peak UV hours); and (d) utilizing composite behaviors (a combination of at least two of the above behaviors). The median relative change for sun-avoidance behaviors was 4% in those studies that had a concurrent comparison group and 16% within those studies that had a before-and-after design. The median relative change for covering-up behaviors ranged from 25% (concurrent comparison) to 70% (before-and-after). Available studies provided sufficient evidence of the effectiveness of interventions in primary schools in improving covering-up behavior. But, the reviewers noted that evidence was insufficient in determining the effectiveness of improving other sun-protective behaviors. Findings from this systematic review provide additional support for the proposed primary school-based sun safety project.

The WHO (2003) published recommendations outlining the necessary steps for establishing school-based programs on sun protection. The report was produced as an outcome from the International Workshop on Children's Sun Protection Education in 2001, hosted by the

WHO involving experts worldwide. The guideline was prepared through collaboration with key stakeholders including the EPA, WHO, national and local authorities, and non-governmental organizations active in the area of health promotion and sun protection programs. The publication failed to provide a description of how potential biases or conflicts of interest of panel members were taken into account during the development of the report. Schools were clearly the targeted audience for the recommendations; however, specific age groups for use of this guideline were not identified. The guideline was created because prevention efforts in schools to change children's knowledge, attitudes, and behavior regarding sun protection could significantly decrease adverse health effects and health care costs. The methods of evidence retrieval for development of the recommendations were not identified within the article. The WHO (2003) reported that a school program on sun protection should adopt an integrated approach to help students, teachers, staff, and the wider community to avoid health risks of UV radiation exposure during school hours and beyond. Furthermore, the WHO (2003) stated that important elements to a school-based sun protection program include (a) sun protection education, (b) a healthy school environment, (c) a school endorsed sun protection policy, and (d) community and family involvement. The WHO (2003) recognized that not all schools would have the resources to integrate sun protection into all of these components. Thus, the organization identified that it is more important to start with small feasible changes than to wait until resources become available to address all components simultaneously.

The WHO (2003) recommended that sun protection education be culturally and geographically relevant and integrated into a range of curriculum areas such as science, mathematics, environmental studies, and the arts. Since a substantial portion of children's time is spent at school or participating in school-based activities, the manner in which a school operates could have a significant impact on children's UV radiation exposure. The key elements of effective sun protective interventions in schools are a comprehensive sun protection policy,

strategies to promote sun protection through appropriate behavior, the school environment, curriculum activities, and a regular review process. The WHO reported that healthy sun-protective practices were more likely to take place if there was consistent information and support from the family, the school, and the community. The WHO (2003) guideline additionally provided a review of recommended practices to minimize exposure to UV radiation which included seeking shade, wearing protective clothing, applying sunscreen, and careful scheduling of outdoor activities. Teaching resources and evaluation materials available online via the World Wide Web (www) accompanied the guideline. Although the authors did not clearly describe methods on how the recommendations will be evaluated or updated in the future, the guideline proposed possible methods of implementation and barriers that were pertinent to this EBP project.

Level II evidence.

White, Hyde, O'Connor, Naumann, and Hawkes (2010) conducted a randomized controlled trial evaluating a theory of planned behavior (TPB) belief-based intervention to increase adolescents' sun-protective behaviors. The researchers recruited 80 adolescents (aged 13 to 16 years) from two secondary schools in Queensland, Australia from October 2007 to June 2008. No prior calculation for sample size was evident in the article measures. Participants were allocated to either the intervention or control group based on the class they were attending and randomized based on the scheduled timetabling of classes. Neither the participants nor the facilitators were blind to group assignment. Incentives, which included entry into a drawing to win one of two Apple iPods, were used to encourage participation of students. Participants in the control group had the opportunity to receive the intervention materials after project completion. The study design was appropriate to answer the researchers' objectives.

The intervention within the White et al. (2010) study comprised of three, 1-hour in-school sessions (one hour a week over three weeks) facilitated by Cancer Council Queensland employees with sessions incorporating the belief basis of the TPB. Session one encouraged supportive behavioral beliefs about sun protection (advantages and disadvantages). Session two fostered perceptions of normative support for sun protection (normative beliefs). Session three enhanced perceptions of control over using sun protection (control beliefs).

Participants completed questionnaires assessing sun-safety beliefs, intentions, and behavior pre- and post-intervention. Repeated Measures Multivariate Analysis of Variance (MANOVA) was used to evaluate the effect of the intervention across time on these constructs. The target behavior was “performing sun-protective behaviors (i.e., using sun protection factor (SPF) 30+ sunscreen, wearing protective clothing such as a hat, long-sleeved shirt and sunglasses, and seeking shade between 10 a.m. and 3 p.m.) every time you go in the sun for more than 10 minutes during the next week”. Scores were averaged to create each belief scale.

Across the intervention period, 26 of the White et al. (2010) participants dropped out due to absence from class or failure to return a completed questionnaire post intervention. Analysis did not identify any differences among age, gender, or skin type between those who completed only the pre-test questionnaire to those who completed both pre- and post-test questionnaires. Condition (intervention group vs. control group) was the between-participants factor and the within-participants factor was Time (pre-intervention vs. post-intervention). The belief measures, intention, and behavior served as the dependent variables. Results, revealed no significant effect for condition or time; however, there was a significant multivariate time x condition effect, $p = .011$. For normative beliefs, significance was found across time in the intervention group ($p = .082$), but not in control condition ($p = .233$). There was a significant difference in motivator beliefs across time in both the intervention ($p = .012$) and control group ($p = 0.15$). Behaviors demonstrated a difference approaching significance across time in the intervention group

($p = .065$), but not in the control group ($p = .200$). Following the TPB belief-based intervention, an increase in adolescents' intentions to sun-protect and reported behavior from pre- to post-intervention was found. These results provided some preliminary evidence that the intervention was successful in facilitating change in both the immediate precursor to (intentions) and self-reported behavior.

There was also a trend in the intervention group showing an increase in adolescents' belief that a range of important people (e.g., family, friends, and teachers) would want them to sun-protect, with no associated change in the control group. Furthermore, adolescents in the intervention group reported an increase in their belief that motivating factors (e.g., the availability of "fashionable" protective gear) would encourage them to sun protect, whereas adolescents in the control group reported a decrease in their belief across time. The study results reported by White et al. (2010) were consistent with previous sun safety research findings; thus, they provided support for the proposed EBP project. Yet, despite the strength of this evidence and applicability to the proposed EBP project, the sample size was small and self-reported measures can be viewed as a limitation for applicability to the Healthy Skin is IN program. This group of participants was similar to the population of adolescents targeted within the EBP project, with the exception of the geographical location. White et al.'s (2010) research findings supported the assumption that strengthening beliefs about the approval of others and motivators for sun protection would encourage sun-safe cognitions and actions among adolescents within this EBP project.

Geller, Rutsch, Kenausis, & Zhang (2003) evaluated the EPA's SunWise, an ongoing national environmental and health education program for sun safety designed for children in elementary and middle schools, effects on students' knowledge, attitudes, and practices. The evaluation of this curriculum program has been set against the backdrop of the CDC's developed guidelines for school programs to prevent skin cancer. The goal of the SunWise

program has been to provide sun protection education to at least 20% of the nation's schools, kindergarten through eighth grades, by the year 2005 in order to ultimately reduce the incidence and effects of skin cancer and other UV-related health problems. All elementary and middle schools in the U.S. have been eligible to participate in the SunWise program. Schools have been recruited by distributing information through conferences, meetings, newsletters, publications, the Internet, and referrals from partner organizations. The program has been designed for school faculty, including school nurses and classroom teachers. Single classrooms, multiple classrooms, schools, or entire school districts have been eligible to participate. Within the Geller, Rutsch, Kenausis, & Zhang (2003) evaluation, an expert panel of educators, curriculum specialists, and skin cancer researchers reviewed the lessons included in the SunWise program. These lessons have focused on three key areas (a) effects of UV radiation, (b) risk factors for overexposure, and (c) sun-protection habits. The program has recognized the many demands on educators' time and has been designed to be flexible, requiring a minimal time commitment of one to two hours. One of the more popular activities incorporated into the program has instructed students on how to test different sunscreens using UV sensitive devices.

The effect of classroom lessons on students' knowledge, attitudes, practices, and intended practice was evaluated Geller, Rutsch, Kenausis, & Zhang (2003) using identical, self-administered surveys distributed prior to and immediately after the SunWise school program. The survey was derived from other instruments, reviewed and edited by educational and child development experts, piloted tested in children, and time tested to ensure completion within 5 to 7 minutes. In 1999, one large school district agreed to serve as a control site (receiving no educational program); their scores were compared with experimental schools surveyed nationwide at exactly the same point. Of the 455 participating experimental schools, 137 were randomly chosen to receive surveys. Of these, students at 85 schools completed pretest and

posttests. Surveys were conducted by school nurses in two separate academic years to evaluate if there was maintenance in new knowledge and healthy attitudes within the aggregate group and if there would be any changes in sun protection practices or sun-burning rates. Initial surveys were anonymous and not coded, therefore it was not possible to link individual students' answers from both surveys.

Within the 85 schools participating in the survey, students completed 4,559 pre-tests and 4,016 post-tests. The majority of students surveyed were attending public schools and between the ages of 5 and 13, representative of the population and setting proposed for this EBP project. The 85 schools were located in cities, suburbs, and rural area in 35 geographically representative states. The researchers noted a marked improvement for all three knowledge variables measured. Identifying that wearing a hat and shirt outside were ways to keep the skin safe from the sun increased from 60% to 75% ($p < 0.001$). At pre-test, 50% of children were aware that SPF 15 was the minimal number needed for sun protection, 37% stated that they did not know, and 13% identified less than SPF 15. At post-test, 78% indicated SPF 15 was the minimal number, and the proportion of children who said they did not know this decreased to 16% ($p < 0.001$). At baseline, 27% of children reported that they thought suntans were good for their skin compared with 20% at post-test ($p < 0.001$), with a change in this belief slightly more likely in younger children. Yet, overall there were few changes in student's sun safe practices. Sunscreen (26%), sunglasses (23%), long-sleeved shirts (16%), and hats (16%) were used sporadically with little change at post-test. Intentions to play in the shade increased from 70% to 76% from pre-test to post-test ($p = .001$). Intentions to use sunscreen increased slightly from 64% to 67%, with few differences between younger and older children. When comparing control and experimental schools, students in control schools showed no increases in knowledge or beliefs about tanning and reported fewer intentions to play in the shade.

Additionally, school nurses at 11 schools in six states surveyed the same children during the 2000-2001 and 2001-2002 school years. Among 477 children completing three surveys, gains in knowledge and attitudes were maintained, but sun burning rates were lower in the most recent summer, 55% in summer 2001 compared to 66% for summer 2000 ($p < .05$). The measure of the effect of the program was not the change in individual students' responses but rather the difference between the pretest and the posttest in the percentage of students providing responses. There were few differences in practices between the two periods, although intentions to play in the shade increased. The evaluation of the SunWise school program provided valuable evidence for this project given the substantial increases in children's knowledge, modest changes in children's perception of the healthiness of a tan, and their increased intentions to play in the shade.

Olson et al. (2007) conducted a randomized, controlled trial in 10 U.S. communities to assess the impact of the SunSafe in Middle School Years program. The researchers hypothesized that a multicomponent community intervention would limit the decline in sun protection expected to occur between grades six and eight. Although the program targeted the community at large, the incorporation of school-based education met inclusion criteria as evidence for this EBP project. Ten communities were matched into five pairs on the basis of school and key community characteristics and then randomly assigned to intervention or control status. A multicomponent intervention was designed to deliver sun-protective messages through multiple channels in the school and community. The intervention was provided at schools, athletic and recreation facilities, primary care practices, and other community venues. Program materials and training for adult role models emphasized two roles: protecting themselves and being an effective role model and educator for the teens. Teen materials emphasized being protected while having outdoor fun. The education sessions for students and adult role models were based on Rogers' protection motivation theory. The intervention included a 30-minute

introductory educational session to increase awareness of adolescent sun protection rates and the risk of skin cancer from UV exposure for adult audiences (clinicians, school personnel, pool/beach staff, athletic coaches). The viewing of participants' skin damage under UV-filtered light in a Dermascan reinforced the importance of personal sun protection.

Each school had a volunteer school liaison, more commonly a school nurse or health educator, selected by the principal. At the first school presentation, teachers were offered access to brief curricular activities that could be incorporated into existing curriculum. The EPA's SunWise curriculum materials and additional activities designed for art, language arts, and social studies provided options for all subjects. Project staff and physical education teachers conducted a 45-minute activity for all students. The student intervention included an interactive slide show about UV radiation, skin cancer, and sun-protection strategies. This was followed by each student viewing his or her face in a Dermascan device. In addition, teachers were recruited to form and lead a group of eighth to twelfth grade students, called a "sun team" to conduct peer education activities. Teams held poster contests, videotaped performances of sun-safety messages, sold student-created buttons as fundraisers for the local ACS, promoted sun safety at school outdoor events, and presented weekly public service announcements on the school public announcement system. Spring and fall sports offered through the school or community were also targeted (i.e., soccer, tennis, baseball/softball, lacrosse, track, field hockey). Each coach or lifeguard received training similar to that of the school liaisons and were encouraged to develop specific approaches to promote sun protection for their audience.

Students who received one or two years of intervention exposure were compared with students of the same grade in control communities in each data-collection period. Of the 13 middle schools approached, 10 principals agreed to participate. Overall, there was an average of 30 observation days per year with an average of 10 that occurred at school sponsored events. The intervention schools' requests for the project's curricular materials ranged from 21%

to 53% of the teachers. In the following two years, 39% of all teachers in these schools reported integrating teaching about solar radiation, skin cancer, and sun protection in their subjects.

Results indicated that an average of 9.7% more body surface area (BSA) was protected in the intervention teens compared to the control group after two years. After two years, 36.1% of intervention subjects were well protected versus 12.8% of controls ($p < .001$). The average number of different sources of advice about sun protection steadily declined in the control communities, but was maintained over time in the intervention communities. This study was the first multicomponent adolescent intervention to include both the school and community partners. The actual BSA protected rather than self-report of usual or intended sun protection was a more rigorous outcome in comparison to previous study measures. Olson et al. (2007) provided new approaches to engaging adults and teens in the issue of sun protection with relevance to this EBP project.

Buller, Reynolds, et al. (2006) performed a pair-matched, group-randomized, pre-post test, controlled trial to evaluate the Sunny Days Healthy Ways (SDHW) skin cancer prevention curriculum among children enrolled in grades six through eight. Schools were stratified by state, and paired on size, grade levels participating, proportion of minority students, and proportion of students on free or reduced meals. The study was conducted within Colorado, New Mexico, and Arizona. The SDHW program had previously shown to be effective in primary schools, and the aim of this report was to evaluate the effectiveness among middle school populations. The main hypothesis was that children who received the SDHW education would report greater sun protection at post-test than children who did not. The researchers unit of randomization was schools ($n = 30$). Teachers of health education and science were key participants ($n = 41$ teachers; 145 classes). Schools classified SDHW as experimental instructional materials and presented them to all students. The SDHW curriculum included six 50-minute lessons intended to increase perceived personal risk for skin damage and skin cancer, positive outcome

expectations about sun protection to reduce personal risk, and self-efficacy expectations for performing sun protection in a variety of situations. Key prevention skills were addressed including (a) selecting and applying sunscreen, (b) selecting sun protective clothing, hats and sunglasses, (c) using shade, and (d) minimizing time in the sun. Teachers in intervention schools attended 2-hour training sessions. The research staff provided information on sun safety and skin cancer, reviewed the curriculum, and described implementation and testing procedures.

The surveys contained a variety of self-reported measures on sun-protection. To further validate the self-reports, a subsample of children from each class had their skin tone assessed using a colorimeter. The sample size and analyses were designed to adjust for the clustering within schools. Initially, 2,038 students completed the pretest, and 1,788 (87.8%) completed the post-test. The final sample contained slightly more girls than boys and was predominately white, with the largest age group identified as 13 years old. Findings indicated that children in intervention schools reported more-frequent sun protection than those in control schools. Exposure to SDHW was associated with greater use of sunscreen at all times. The post-test self-reported measure of sun-safe behavior was correlated with the skin tone measure by colorimeter. The greater the reported use of sunscreen, the lower the redness of the skin as measured by redness scale ($p = 0.002$), and the lower the darkness on the light-dark scale ($p = 0.009$). SDHW also produced positive changes in secondary measures. Children in intervention schools demonstrated more knowledge of sun safety, less favorable attitudes toward sun tanning, fewer barriers to sun protection, and more positive self-efficacy expectations for using sunscreen with SPF of ≥ 15 at post-test than children in control schools.

SDHW was effective with children in grades six through eight. The program had a positive impact on a broad range of outcomes, especially sun-protective behavior. Overall, the impact of the middle school SDHW curriculum was comparable to that produced by the primary

school SDHW. The authors provided sufficient evidence to support using middle schools as an effective venue for delivering sun-protection education to children.

Kristjansson, Helgason, Mansson-Brahme, Widlund-Ivarson, and Ullen (2003) tested the effectiveness of a short-duration presentation of the educational material 'You and Your Skin' using a non-equivalent control group design. The purpose of this study was to evaluate the effectiveness of a school-based intervention program using the skin cancer prevention kit 'You and Your Skin'. The educational kit was developed in cooperation with the Swedish Radiation Protection Institute and the Department of Cancer Prevention in 1996. Close collaboration with teachers and students in a school not participating in the evaluation study also assisted in the development of instruments utilized. The intervention was presented in one 45-minute session to students in grades seven and eight attending five non-private schools in Stockholm County, Sweden. Authors hypothesized that the intervention group would show a greater increase between the pre-test and the post-test evaluations than the control group in the following categories: (a) knowledge of the risk factors for skin cancer, UV radiation exposure, and sun-protection behaviors, (b) attitude towards sunbathing and tanning, and (c) consciousness of skin cancer risks. Thus, the investigators also predicted that there would be a larger number of students in the intervention group who would progress in their readiness to change sun protection behaviors than in the control group.

Four municipalities in Stockholm County, Sweden were selected for participation in the study on the basis of size and socioeconomic status. Students ($n = 130$) were asked to write an essay on sun and tanning-related themes, and the authors processed the essays in a focus discussion using the HBM to guide the intervention. Sun-protective behaviors (i.e., staying in the shade, avoiding the sun between 11 a.m. and 3 p.m., using clothes to block exposure to the sun, applying a sunscreen with a SPF of 15 or higher to exposed skin, and avoiding artificial sunbeds) were highlighted. Complying with the suggestions of students and teachers, the

intervention emphasized positive messages using humor to capture the attention of the students, and avoided the use of fear propaganda. The educational package, delivered in one lesson by the student's regular teacher or school nurse, contained (a) a manual for teachers, (b) 10 overhead transparencies, (c) a 7-minute video tape, and (d) recommendations and instructions on how to behave in the sun. In addition to the educational curriculum, students were encouraged to participate in group activities such as making posters and/or designing webpages. The educational kit was distributed to various schools prior to implementation through a marketing study. After distribution, 94% of teachers revealed they were satisfied with the material and the appropriateness of the educational content for this age group.

Two interventions and two control classes were selected in each municipality. In every school, there were an equal number of classes randomly assigned to intervention or control. One teacher or nurse from each school was responsible for conducting the study and collecting data. Each student was given an identification number before the pre-test to allow analysis at the individual level. Students were evaluated one week pre-intervention and three months post-intervention in both the control and intervention groups. The questionnaire was acceptable for face validity, reliability, and comprehension in students of the same age. Furthermore, the questionnaire was evaluated by dermatologists, oncologists, and experts in skin cancer prevention prior to the study.

The effects of the intervention were analyzed by comparing mean scores on overall knowledge and attitude items at pre-test and post-test, using the paired samples *t*-test. Comparisons of groups, with regard to the number of participants who had increased their knowledge between pre-test and post-test, was undertaken using the chi-square test. A total of 184 students who completed the pre-test and post-test were analyzed at both the group and individual level. There were no statistically significant differences across genders, school-year levels, or schools in both the pre-test and post-test in all measured variables. The level of

significance was $p < 0.05$ for all statistical analyses. Analyses were conducted using the statistical package SPSS for Windows. The intervention and control groups were equivalent regarding gender, age, skin type, hair color, and stages of change distribution.

The intervention group had a higher proportion of students who were able to progress in their readiness to give up sunbathing ($p = 0.01$). Furthermore, the mean gain score for knowledge was greater in the intervention group than in the control group, 1.7 and 0.7, respectively ($p < 0.05$). The mean score of four of five attitude items increased within the intervention group, correlating with less favorable attitudes towards tanning and sunbathing. Overall, there was a larger number of students in the intervention group who progressed in their readiness to change sun-protection behaviors than in the control group. The educational kit 'You and Your Skin' provided great depth to the current body of evidence supporting skin cancer prevention educational programs for adolescents. Kristjansson et al. (2003) recommended more extensive interventions to affect attitudes and motivation to change sun-protection behaviors in future studies.

Level V evidence.

Hart and DeMarco (2008) performed a review of the literature to evaluate the status of primary prevention interventions and identify gaps in national and international research in order to make suggestions for further intervention design. An extensive search of MEDLINE, CINAHL, and PsycINFO using the keywords "skin cancer prevention", "skin cancer intervention", and "sun exposure" was conducted to gather information for the literature review. Also, reference lists from the articles obtained within these databases were examined to further evaluate applicable articles for inclusion. Hart and DeMarco (2008) reviewed primary prevention studies related to the prevention of skin cancer through the following common themes: primary schools, secondary schools and colleges, outdoor recreational and tourism settings, healthcare

providers, media, national and international information, and psychological and social aspects. All topics of review were of relevance to this EBP project; however, the emphasis on primary prevention and primary schools was the main focus for inclusion of this evidence within the developed interventions.

Primary prevention interventions in primary schools have targeted children between kindergarten and eighth grade. These educational programs and behavioral initiatives have aimed to augment students' knowledge of sun-safe behaviors and attitudes toward skin protection to encourage students to practice more sun protective behaviors. The literature revealed that educational interventions have also been aimed at educating teachers and parents (adult role models) about the dangers of UV radiation from the sun. Hart and DeMarco (2008) reported that primary school-age children are more responsive to efforts to increase sun-safe behaviors and improve attitudes toward skin cancer prevention than older children, and because most children spend the majority of peak hours for UV radiation at school, primary school education is a popular method of primary prevention. The authors of this literature review discussed that the recently released CDC guidelines have been used as a common guide for school programs, as outlined previously within the literature appraisal. Furthermore, Hart and DeMarco (2008) identified the necessity of parent and teacher collaboration for enhanced knowledge, behaviors, and attitudes, in addition to flexibility and moderation when working with students.

Primary prevention in primary schools has focused predominantly on augmenting the prevalence of sun-safe behaviors, awareness, and attitudes. Behavioral interventions include the use of hats and protective clothing when exposed to the sun (Buendell, 2002; Eakin, Maddock, Techur-Pedro, Kaliko, & Derauf, 2004; Geller, Rutsch, Kenausis, & Zhang, 2003; Milne et al., 1999; Reynolds et al., 2006), seeking shade when outdoors (Buendell, 2002; Eakin et al., 2004; Geller, Rutsch, Kenausis, Selzer, et al., 2003; Milne et al., 1999; Reynolds et al.,

2006), wearing sunglasses for eye protection (Buendell, 2002; Geller, Rutsch, Kenausis, & Zhang, 2003; Reynolds et al., 2006), using sunscreen with a proper sun-protection factor (Buendell, 2002; Eakin et al., 2004; Geller, Rutsch, Kenausis, & Zhang, 2003; Reynolds et al., 2006), establishing a school policy for sun protection and creating a school schedule to accommodate avoidance of peak levels of UV radiation (Buendell, 2002; Eakin et al., 2004), and creating a partnership between students, teachers, and parents to achieve maximum success (Buendell 2002; Eakin et al., 2004). Changing attitudes toward sun safety and UV radiation exposure was also a goal of these educational interventions (Buendell, 2002; Eakin et al., 2004, Geller, Rutsch, Kenausis, & Zhang, 2003). Hart and DeMarco (2008) evaluated the effectiveness of programs such as Western Australia's Kidskin, SDHW, and the EPA's SunWise. In summary, primary prevention interventions at the primary school level have experienced successes that other prevention programs have not shared. These programs have demonstrated effectiveness as models for prevention efforts in other areas of the community and were used as the foundation of this EBP project.

Although, Hart and DeMarco (2008) reported that the U.S. and international programs for skin cancer prevention have the same basic goals, the authors noted that prevention programs and interventions have been more advanced, more successful, and more extensive in Australia than in North America and Europe (Buller & Borland, 1998; Montague, Borland, & Sinclair, 2001; Stanton, Janda, Baade, & Anderson, 2004). The common goal within these prevention programs was to reduce the incidence of skin cancer by increasing awareness and knowledge of skin cancer, sun safety, and sun-protective behaviors and attitudes. Australia has been identified as the nation with the highest incidence of cancer in the world and has seen much success from effective skin cancer interventions (Montague et al., 2001). Australia has initiated two major skin cancer prevention interventions, Slip! Slop! Slap! and SunSmart. Launched in 1980, Slip! Slop! Slap! has encouraged Australians to "slip" on protective clothing,

“slop” on sunscreen, and “slap” on a hat. SunSmart, founded in 1988, has aimed to educate the public, advocate for sun protection policies, and encourage behavioral changes for sun safety. Following a review of the literature, Hart and DeMarco (2008) reported that these programs have been successful at changing behaviors and attitudes of the Australian population. Thus, the efforts of international campaigns to guide practice in the U.S. assisted the coordinator of this EBP project in obtaining positive outcomes.

Hart and DeMarco (2008) also evaluated the psychological and social aspects of primary prevention. In their review, the authors stated that one of the biggest obstacles to overcome in skin cancer prevention was not spreading awareness and knowledge, but rather challenging attitudes toward the sun and tanning, cultural norms, and societal pressures. Hart and DeMarco (2008) explained that for boys, the appeal of a tan seems to be an image of masculinity, but in for girls having a tan is seen as attractive. Within Hart and DeMarco’s review, an attitudinal intervention in Maryland for young teenagers assessed the effects of the competing attitudes that tans are attractive and healthy and that practicing sun-safe behavior is ‘cool’ (Alberg, Herbst, Genkinger, & Duszynsky, 2002). Alberg et al. (2002) noted that although girls were more aware of the dangers of the sun, they were also more receptive to the idea that tanning was attractive. Therefore, Hart and DeMarco (2008) summarized the need to promote positive attitudes concerning sun protection and to eradicate ideas relating tan skin to attractiveness. Hart and DeMarco noted that although students were educated on sun-protective behaviors, they did not practice sun safety because social norms and attitudes toward tanning were stronger than the desire to be protected. Hart and DeMarco’s review of the literature provided valuable insight to this proposed EBP project, particularly because of the Healthy Skin is IN program’s focus on primary prevention and skin cancer.

Townsend et al. (2011) incorporated a qualitative case study approach to evaluate results from New Mexico’s Raising Awareness in Youth about Sun Safety (RAYS) Project, the

Sun Protection in Florida Project, and the Arizona SunWise Program. The objective of this study was to highlight barriers and facilitators to implementing interventions across multiple populations in three state comprehensive cancer control (CCC) programs that implemented primary school-based sun-safety educational programs. Qualitative case study has been a useful method for assessing program implementation, because it adds depth of understanding and ascertainment of context that cannot be obtained from strictly quantitative methods (Yin, 2009). The CDC provided funding for the programs through the National Comprehensive Cancer Control Program (NCCCP) to establish broad-based CCC coalitions, assess the burden of cancer, and develop and implement CCC plans to reduce cancer incidence and mortality. All three states identified within this study had objectives addressing skin cancer prevention in their cancer plans and were located in areas of the U.S. with high sun exposure. Each skin cancer prevention program represented a single case. Case studies were conducted through semi-structured narrative summaries provided by the CCC program director overseeing the sun-safety program. Townsend et al. (2011) identified skin cancer intervention programs to include as case studies by conducting a document review identifying CCC programs and partnerships that were implementing interventions around skin cancer prevention that used evidence-based strategies from the *Community Guide*. Townsend et al. (2011) also reviewed interim progress reports submitted to CDC by nine NCCCP grantees receiving skin cancer prevention additional funds and abstracts submitted to the 2008 and 2009 NCCCP Program Directors' Meeting Poster Sessions. This document review guided the development of a semi-structured questionnaire to collect narrative program summaries.

Townsend et al. (2011) collected the following information from three CCC programs through narrative summary: (a) rationale for implementing a school-based educational intervention for melanoma/skin cancer; (b) description of the program including objectives, theoretical framework, and the source of evidence base for the program; (c) implementation of

the program including relevant partners, how schools were selected to receive the program, and implementation barriers; and (d) description of the evaluation process and notable evaluation results. The authors supplemented narrative summaries to triangulate data with program interim, annual progress reports, evaluation reports, melanoma incidence data, program websites, state cancer plans, and fact sheets. Townsend et al. (2011) then coded the narrative summaries by hand to identify common themes around program implementation strategies, barriers and facilitators of implementation, environmental factors, external partnerships, program champions, training evaluation, and school policy change. No formal analyses using qualitative software were conducted.

Townsend et al.'s (2011) findings indicated that age-adjusted melanoma incidence rates for both sexes, all ages, and all races/ethnicities were similar across the three states. Arizona and New Mexico both had nonstatistically significant declines in melanoma incidence over the 2003 to 2007 time period, whereas Florida experienced a nonstatistically significant increase in rates. Although each state used similar educational models, including the EPA SunWise program across all three states, there were considerable differences in strategies for implementing these programs. Arizona's SunWise program had 100% coverage of children attending public school in kindergarten through eighth grade. Sun Protection in Florida's program had the least reach, but had been targeted to counties based on melanoma incidence rates and the size of the youth population.

New Mexico's approach for implementing the RAYS project included issuing mini grants for schools and community organizations to support sun-safety educational programs. Schools were encouraged, but not required, to implement policy and environmental change to promote sun safety. Student and teacher evaluations were important components of the program. The RAYS project was developed in 2001 by the New Mexico Department of Health Comprehensive Cancer Program and Public Education Department. The project was guided by a

socioecological model, recognizing the importance of community and policy level actions to support change. The educational component consisted of three curricula schools could choose from: (a) SDHW, (b) SunSmart Project, or (c) the EPA SunWise Program. A toolkit containing educational materials, resources, and evaluation instruments were developed. Because almost half of the population (44.5%) reported being of Hispanic origin, materials were made available in both English and Spanish. The following sun safety messages were stressed: avoiding the sun between 10 a.m. and 4 p.m., wearing sun-protective clothing when exposed to sunlight, and using sunscreen with a SPF of 15 or higher. Between 2006 and 2009, more than 3,600 children in 69 classrooms completed the pre-tests and post-tests evaluating changes in knowledge, beliefs, and behavior. Overall, post-tests demonstrated behavior change in a positive direction. Pre-test to post-test differences indicate increases in “always/sometimes” responses for playing in the shade, wearing a hat, using sunscreen, and wearing sunglasses among the majority of classrooms. Additionally, 128 teachers were surveyed from 2006 to 2009 and nearly half of teachers surveyed reported changes in their own sun protection behavior.

The Florida Department of Health Bureau of Chronic Disease Prevention and Health Promotion CCC Program received funding through a grant from the CDC to implement the Sun Protection in Florida project within five counties. Sun Protection in Florida’s model involved working with community-based health and wellness programs at local health departments to approach schools with the largest student populations. Changing the school environment to support sun-safety behavior was an important component to Florida’s program, incorporating shade structures to participating schools. The program has incorporated the EPA SunWise curriculum for children in kindergarten through eighth grade. Schools that participated have received a year round shade shelter structure. The CCC program collaborated with the Florida Department of Health Healthy Communities Healthy People Program (HCHPP) to implement the Florida Sun Protection project. Each HCHPP coordinator was required to teach 150 youth

per school through educational sessions, materials, and administration of pre- and post-test evaluations. Individual results from the five counties revealed an increase in sun-safety knowledge after the education session, particularly for use of protective clothing, ability to sunburn on a cloudy day, and correct minimum sun protection factor number to use for sunscreen. Furthermore, after second year implementation, an electronic survey to participating schools indicated that more than 80% of schools allowed students to wear hats or sunglasses outdoors, and 66% reported a need for more shade protection.

Of the three CCC programs evaluated in this study, Arizona was the only state that had a statewide sun-safety program. Arizona's approach had been comprehensive and included partners in after-school and parks and recreation programs that teach the SunWise program. Implementation has also been supported by providing emailed toolkits, conducting school assemblies, and training educators to teach the curriculum. In 2003, the Arizona Department of Health Services received funding through the CDC to address the state's melanoma and overall cancer incidence rates. A panel of experts from the fields of dermatology, cancer prevention, public health, school nursing, and education, along with parents, survivors, and the media gathered to review guideline data from professional and government organizations and to formulate a strategy to address the state's melanoma incidence. Arizona became the first state to legislatively mandate sun-safety education, specifically adopting the SunWise school program. Arizona's SunWise has had over 100 key partners who have supported and promoted sun safety by teaching the program in their after-school, aquatic, and parks and recreation programs: summer camps; and outreach events. Process evaluation has been collected through online teacher surveys. Evaluation data has also tracked (a) students' attitudes toward sun-safety interventions, (b) sunscreen use, (c) covering up with clothing, (d) seeking shaded play areas, and (e) awareness of the UV index. Outcome evaluation of the SunWise program was calculated through a randomized year-long control study with three school districts that tracked

1,455 students. Evaluation showed marked outcome improvement, 75% in some areas, of student willingness and commitment to protect skin by using sun safety strategies. Townsend et al. (2011) concluded that school-based educational strategies are just one approach to addressing sun safety, and ideally these strategies should be a part of a more comprehensive plan to prevent skin cancer.

Level VI evidence.

Kamell et al. (2011) evaluated a program created by University of California-Irvine (UCI) medical students to educate adolescents about skin cancer. The program initially titled the Joel Myres Melanoma Awareness Project, now extended to be The National Melanoma Awareness Project, was developed with concern for the high risk local population of Orange County, California. Medical students developed a program to teach students in grades six through twelve about the importance of sun protection and early detection of skin cancer. The project was created in memory of Joel Myres, a UCI medical student who passed away from melanoma which had first presented when Joel was 16 years old. The project innovators created a 50-minute interactive curriculum based on a review of the literature and other existing skin cancer educational programs. Kamell et al. (2011) referred to these materials in the reference list included at the conclusion of the article. The curriculum focused on skin structure and function, effects of solar radiation, the three major kinds of skin cancer, skin cancer self-screening for earlier detection, and tools for safer sun enjoyment. The program was interconnected with school lessons, drawing on students' mathematics, sciences, critical thought, and health skills. The program also incorporated an emphasis on early detection with the message: "Spot a Spot, Save a Life!"

The National Melanoma Awareness Project began as a local effort by three medical students educating 1,200 teens in 2003, but within three years the program grew into a national

awareness project with over 25 medical school chapters educating over 14,000 students annually since 2005. To evaluate the efficacy of this outreach program, UCI medical students surveyed 1,260 students in grades 6 to 12 at five Orange County, CA public schools. Surveys were completed before, immediately after, and three months following a single 50-minute lecture. Responses were combined into index scores for knowledge, attitude, and behavior categories. Tests included ANOVA, student's *t*-test, and Pearson's chi-square test, with statistical significance for all testing set at $p < 0.05$. Significant, sustained improvement in knowledge ($p < 0.001$) and behavior ($p < 0.001$) scores from the first to third survey was reported. Additionally, students revealed healthier attitudes immediately following the intervention, but returned to baseline within three months. In response to this information, Kamel et al. (2011) suggested that attitudes may be culturally engrained and less amenable to change with a single intervention. This outreach program demonstrated the successful use of health care providers to increase melanoma awareness within school systems. The project outcomes reported by Kamel et al. (2011) were important considerations during the implementation of this similarly designed, Doctorate of Nursing Practice (DNP) student-directed EBP project.

Olson et al. (2008) explored the impact of an adolescent health- and appearance-focused educational intervention, including viewing of facial skin changes under UV light, on future intentions to use sunscreen. Previous studies with older adolescents had shown that college students were more likely to change their behaviors when the risk-to-appearance was emphasized rather than health (Hillhouse & Turrisi, 2002; Jones & Leary, 1994). Studies have found that risk-to-appearance interventions can result in improved sun protection up to two years later (Rossi, Blais, Redding, & Weinstock, 1995; Weinstock & Rossi, 1998). Olson, Gaffney, Starr, and Dietrich's research used a new educational approach to sun-safety where students not only received educational material, but also viewed skin changes from sun exposure under UV light.

Within the Olson et al. (2008) study, all seventh and eighth grade students in a rural Vermont middle school participated in a sun protection health education session with two components. Students received a 30-minute educational session with visual materials on the risk of sun exposure as well as practical strategies on how to improve sun protection. Specific messages about photo-aging and appearance-related issues were included. Following the educational session, students viewed their face under filtered UV light using a Dermascan. While staff emphasized that these early skin changes were not skin cancer, they did explain the importance of sun protection to reduce future damage. Peer viewing was encouraged because it promoted peer discussion and helped establish a positive sun protection social norm among the class. Based on the theory of reasoned action, behavioral intention for using sunscreen was assessed. In addition, past and future use of sunscreen and pros/cons of sun protection were evaluated. Based on existing literature and the researchers' prior work with a cohort of middle school students, two sets of questions were developed to assess pro-sun exposure attitudes and pro-sun protection attitudes. Factor analysis of questions and inclusion of items with Cronbach's alpha > 0.65 resulted in the inclusion of three items for a sun benefit attitude scale and three items for a sun risk scale.

The Vermont middle school students completed questionnaires the day before the educational session and two weeks following during health education class. Surveys were anonymous and matched by identifier codes, with a total of 108 initial participants. To determine the impact of the Dermascan viewing, scores were collapsed into a dichotomous response; 'some or lots of damage seen' as 'skin damage seen' and 'no damage or did not look' as 'damage not seen'. The final study population consisted of 49 (43%) seventh and 64 (57%) eighth grade students, all of which were Caucasian. Prior to the intervention, 19.5% had used sunscreen in the past 12 months but did not currently report use, 41.6% had not used sunscreen in the past 12 months or now, and 21% were consistent users of sunscreen.

Consistent use was more likely in older students (10.2% seventh grade vs. 29.7% eighth grade, $p = 0.01$), but use of sunscreen in the past 12 months did not vary by grade. Among students who were not already consistent users, 29.5% of seventh graders and 30.3% of eighth graders intended to use sunscreen in the next month. The authors also reported that after the intervention, sun benefit and sun risk attitudes changed significantly. In evaluation of the Dermascan viewing, 15% of students had chosen not to view their face, 17% reported no damage, 48% reported they had seen 'some damage' and 20% reported 'lots of damage'. One-third of students who had not previously intended to use sunscreen in the next month indicated that they intended to do so following viewing in the Dermascan.

Within the Olson et al. (2008) study, the brief school intervention that incorporated an appearance-based UV damage component increased student intent to use sunscreen over the following 30 days. Students who were older and those who had viewed skin changes in the Dermascan were nearly 2.5 times more likely to intend to use sunscreen within the next month. The outcome measure of intent to use sunscreen has been strongly linked with actual sun behaviors in other studies. Viewing current skin damage with a device such as a Derma Scan machine may increase adolescents' feelings of susceptibility to skin cancer. Based on the study findings from Olson et al. (2008), adolescent sun protection educational sessions should utilize peer and observed personalized risk assessment.

Irwin et al. (2007) conducted a community service project to teach adolescents in New Jersey about skin care and protection. Irwin et al. (2007) hypothesized that participating in an educational program that integrated education about acne with education about sun-protection behavior would be more likely to lead to adherence to behaviors for skin cancer prevention than participating in an educational program that focused solely on sun protection. The researchers sought to answer the following research questions: (a) What effect does an hour-long, hands-on educational program about skin care have on adolescents' knowledge of skin care, sun

protection, and acne when delivered in middle- and high-school classrooms? and (b) Does adolescents' performance on the pre-test and post-test, and the change score, differ depending on sex, age, ethnicity, or race? The school board at the study school district in central New Jersey agreed to be the site for the educational program. To protect student anonymity, students were randomly assigned a number for the pre-test and post-test, and only the student knew which number he or she was assigned.

The skin sun-acne tutorial (SkinSAT) was administered at five middle schools and three high schools to students in grades six through twelve during May and June of 2006. The duration of the intervention was one hour and occurred during regularly scheduled gym or health class. The intervention was comprised of a survey and pre-test immediately before the lesson, the SkinSAT lesson (approximately 25 minutes), and a post-test immediately after the lesson. All SkinSAT lessons were administered by the same health educator. The lesson included PowerPoint slides, animated text and pictures, and live narration by the health educator. The lesson reviewed the anatomy of the skin, a background on skin cancer and acne, and skin care tips including how to protect oneself from the sun and how to prevent and treat acne. Hands-on class activities, such as reviewing ingredients or shopping for appropriate products among classmates, were also utilized. The survey collected demographic information (i.e., sex, gender, ethnicity, race, and grade level), ability to tan versus burn, frequency of acne, and how they treat their skin. The identical pre-test and post-tests consisted of 20 true or false statements. Two-sided *t*-tests were used to compare the pre-test and post-test performance of students and between groups.

A total of 1,214 adolescents in grades six through twelve at five middle schools and three high schools completed the survey and pre-test. Of these students, only 844 also completed the post-test because some of the students had to leave during the lesson and, therefore, did not have time to complete the post-test. The sample demonstrated an equal

representation of male and female students (52% vs. 47%) and a wide range of ages (10 to 19 years), races, and ethnicities. The researchers found a significant difference between pre-test and post-test scores for all questions, both sun-protection and acne related. In addition, total scores for all students improved significantly from the pre-test to post-test. On average, student scores increased by 36.3% ($p < .001$, 95% CI, 78.8%-81.3%) from an average of 43.8% on the pre-test to an average of 80% on the post-test. Among different races, there was a significant difference in pre-test scores among whites, Asians, and blacks. Asian students seemed to gain the most from the lesson, with this group obtaining the greatest change score. Although black students had the same change score as white students, their post-test scores were significantly below both those of whites and Asians. Findings indicated that the SkinSAT was an effective tool for increasing knowledge about sun-protection and acne.

Level VII evidence.

The USPSTF, also known as the task force, is an independent group of national experts in prevention and evidence-based medicine that works to improve the health of all Americans by making evidence-based recommendations about clinical preventive services. The USPSTF is comprised of 16 volunteer members, many practicing clinicians, who come from the fields of preventive medicine and primary care, including the fields of internal medicine, family medicine, pediatrics, behavioral health, obstetrics/gynecology, and nursing. The USDHHS and the Agency for Healthcare Research and Quality (AHRQ) support the organization through the production and dissemination of evidence reports. The task force bases its recommendations on the evidence of the benefits and harms of the services and an assessment of the balance. Costs of providing the service are not considered within their recommendations. The task force found sufficient evidence linking UV radiation exposure during childhood and youth to a moderately increased risk for skin cancer later in life. The task force conducted a literature review including a search for direct evidence that counseling patients about sun protection reduces intermediate

outcomes or skin cancer. Based on this review in 2012, the USPSTF recommended counseling children, adolescents, and young adults (those of ages 10 to 24 years) who have fair skin about minimizing their exposure to UV radiation to reduce the risk of skin cancer. The task force explained that successful counseling interventions used cancer prevention or appearance-focused messages to reach specific audiences. Furthermore, the USPSTF (2012) recommended education and policy interventions for the prevention of skin cancer. Such interventions included community-based communications and policy regulation to increase preventive behaviors (e.g., covering up, using shade, or avoiding the sun during peak UV hours) among populations in specific settings, particularly primary school and outdoor recreational areas. The task force did not find that one specific format was most efficacious for counseling children and adolescents; rather, a number of various educational materials (i.e., pamphlets, posters) using different media were found to be effective. Successful counseling interventions used cancer prevention or appearance-focused messages to reach specific audiences. Appearance-focused messages were successful at reducing intent to pursue indoor tanning among late-adolescents women. Interventions include self-guided books, videos on photo-aging, and 30-minute peer counseling sessions. Commercial products allowing patients and clinicians to see the damaging effects of UV radiation on the skin were also found useful during implementation. UV cameras were identified as one product used to demonstrate to patients the extent of skin damage from UV exposure. The USPSTF (2012) determined that the interventions were of moderate benefit in changing risky behaviors among young persons. This opinion provided support for this proposed multifaceted EBP project.

Since 1979, the SCF has set the standard for educating the public and the medical profession about skin cancer, its prevention by means of sun protection, the need for early detection, and prompt, effective treatment (SCF, 2012). The SCF is comprised of distinguished physicians and lay people dedicated to reducing the incidence of skin cancer. The organization

has sponsored more than 100 research and clinical studies, and has supported several investigations on the genetics of melanoma. The SCF has served as a resource for clinicians treating skin disorders, providing educational material and information to guide practice. The SCF has supported school sun safety legislation and education across the country at every grade level. The SCF's guidelines include (a) seeking shade, (b) avoiding tanning and tanning booths, (c) covering up, (d) using a broad spectrum UVA/UVB sunscreen SPF 15 or higher, (e) applying one ounce of sunscreen 30 minutes before going outdoors, (f) examining skin from head-to-toe every month, and (g) seeing a physician annually for a skin exam. These recommendations have been incorporated into a physician-developed sun safety classroom curriculum titled the Rays Awareness program, targeting grades six through eight. In this curriculum, students learn about UV radiation from the sun and tanning beds, how it affects their skin, and why protecting themselves from both forms of UV exposure is critical to preventing skin cancer. The curriculum has been aligned with CDC National Health Education Standards. Video segments relaying true stories from young adults who have had melanoma have been integrated into the lesson. The instructional component has been designed to consist of vivid images to help students develop an understanding of different skin cancers and to recognize their warning signs. Furthermore, the SCF (2012) has stated that classroom instruction can be enforced through posters, staff-initiated reminders, assemblies conducted by healthcare providers, and sun safety videos. Education should be based on the foundation's guidelines to prevent skin cancer which include similar strategies as discussed in previous studies. The recommendations of the SCF provided additional support for this EBP.

Synthesis of Appraised Literature

The appraisal of relevant literature provided an in-depth understanding of the most current and effective efforts in promoting sun safety education across primary school settings. Studies included in the appraised literature revealed comparable findings and recommendations

for practice (See Appendix A). Relevant studies were conducted in primary and secondary school settings particularly including adolescents enrolled in grades six to eight, ages 11 to 15 years old. While the majority of schools were public, two studies included private and charter school organizations (Geller, Rutsch, Kenausis, & Zhang, 2003; White et al., 2010). Diverse geographical locations across the U.S. were noted among study settings. Sample characteristics were similar among the articles however sample sizes ranged from $n = 49$ (Olson et al., 2008) to $n = 4,559$ student participants (Geller, Rutsch, Kenausis, & Zhang, 2003).

The underlying goal across the studies was to increase the awareness of skin cancer and UV radiation through various effective school-based interventions. Educational efforts targeting young children, especially those incorporating kindergarten through eighth grade, have proven successful in accomplishing this goal (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, Selzer et al., 2003; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kamell et al., 2011; Kristjansson et al., 2003; Olson et al., 2007; Olson et al., 2008; White et al., 2010). Community-wide initiatives, such as programs conducted in recreational settings, inclusive of school-based sun safety education, have also achieved triumphs (Geller, Rutsch, Kenausis, & Zhang, 2003; Olson et al., 2007). Studies aimed to examine the effectiveness of sun safety school-based interventions on students' self-reported protective behaviors, (Buller, Reynolds et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Kamell et al., 2011; Kristjansson et al., 2003; Olson et al., 2007; Olson et al., 2008; White et al., 2010), sun safety knowledge (Buller, Reynolds et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kamell et al., 2011; Kristjansson et al., 2003; Olson et al., 2008), and attitudes toward sun protection (Buller, Reynolds et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Kristjansson et al., 2003; Olson et al., 2008; White et al., 2010).

Provision of sun protective education to children and adolescents was the core school-based strategy identified within this literature review in the promotion of sun safe behaviors.

Methods of delivering sun protective education varied; however, all studies contained the same key concepts within their framework for curriculum design. Key sun protective educational concepts included skin structure and function, effects of UV radiation, skin cancer, self-screening and early detection of skin cancer, sun protective practices, and the importance of the UV index scale. Lessons provided education on identical sun protective behaviors including (a) properly selecting and using broad spectrum (i.e. UV-A and UV-B protection) sunscreens with a SPF of 15 or greater, (b) minimizing exposure to the sun during peak times of UV intensity between the hours of 10:00 a.m. and 4:00 p.m., (c) covering up with protective clothing (i.e., hats, long sleeve shirts, pants, and sunglasses), (d) avoiding indoor tanning beds and sunlamps, (e) seeking shade from the midday sun, and (f) referring to the UV index when scheduling outdoor activities (Buller, Reynolds et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al, 2007; Kamell et al., 2011; Kristjansson et al, 2033; Olson et al., 2007; Olson et al., 2008; White et al., 2010; SCF, 2012; USPSTF, 2012). Among the sun safety programs reviewed, teacher toolkits and manuals (Geller, Rutsch, Kenausis, & Zhang, 2003; Kristjansson et al., 2003; Olson et al., 2007), PowerPoint presentations (Irwin et al., 2007; Olson et al., 2007), multimedia (Kristjansson et al., 2003), overhead transparencies (Kristjansson et al., 2003), images and picture books (Irwin et al., 2007; Olson et al., 2008), poster contests (Geller, Rutsch, Kenausis, & Zhang, 2003; Kristjansson et al., 2003; Olson et al., 2007), community awareness projects (Olson et al., 2007), and hands-on class activities (Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kristjansson et al., 2003; Olson et al., 2007) were the most common interventions utilized.

Programs were commonly directed by those in positions ideal for role-modeling, such as educators, school nurses, and healthcare providers. Appearance-focused education was described as an effective means to overcome attitudinal barriers from societal pressures and social norms among the targeted age group (Hart & DeMarco, 2008; Olson et al., 2008;

USPSTF, 2012). Thus, methods supported in the literature appraisal to overcome these attitudinal obstacles include the use of filtered UV skin viewing devices. Overall, the critically appraised literature provided substantial evidence for using a school-based sun safety educational program to improve the knowledge, attitudes, and behaviors of adolescents, which may ultimately minimize the future risk of developing skin cancer.

Relevant studies demonstrated that children were more inclined to practice sun safe behaviors if they comprehended the importance of the practices. Studies on sun safety education support the ability of school-based programs to increase student sun-protective knowledge (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kamell et al., 2011; Kristjansson et al., 2003; Saraiya et al., 2004; Townsend et al., 2011) and maintain this knowledge over time (Kamell et al., 2011; Kristjansson et al., 2003; Saraiya et al., 2004; Townsend et al., 2011). Furthermore, sufficient evidence demonstrates that gains in knowledge as a result of sun safe school-based programs are also reflective in positive sun-protective attitudes and behaviors (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Kamell et al., 2011; Kristjansson, et al., 2003; Olson et al., 2008; Townsend et al., 2011; White et al, 2010). The ultimate goal of reducing the future risk of skin cancer among adolescents within this project can be achieved by utilizing evidence-based interventions which enhance these variables.

Studies incorporated similar concepts in their framework for program design such as the key components of sun protection policy, environmental change, sun protection education, community and family involvement, and evaluation. Comprehensive sun safety school programs incorporating multiple interventions and partnerships were more successful than brief educational sessions alone (Hart & DeMarco, 2003). Researchers demonstrated that sun safety curricula must be both effective and economical and woven into existing classroom lessons for success (Geller, Rutsch, Kenausis, & Zhang, 2003; Glanz, Saraiya et al., 2002; WHO, 2003). In

conclusion, although longitudinal studies demonstrating a correlation between sun safety school-based programs and skin cancer development are non-existent, the current literature supports effective interventions to aid in the future reduction of disease burden. Beyond the health benefits, effective education programs can significantly reduce costs in the healthcare system (WHO, 2003).

Best Practice Model

The best practice model recommendation developed for this project was synthesized from the most current best available evidence integrated from the critically appraised literature. Health risks of excessive UV radiation exposure are often not perceived as important in the school context; however, involving members of the school and community can help establish a program respondent to students' needs, which can be maintained over time. The WHO (2003) reported that teachers are more willing to incorporate ready-made lesson plans which are linked to key curricular areas. Therefore, the sun safety school-based curriculum (see Appendix B) and PowerPoint presentation (see Appendix C) were created as a means to link current evidence and curricular themes in a timely, efficient manner with the potential to impact all middle school students. This program was developed in a teacher-friendly format that easily aligned with state educational standards and can be infused into existing curriculum maps. This author proposed that implementing the best practice model, Healthy Skin is IN, would demonstrate that students participating in a multifaceted sun safety school-based program would demonstrate positive shifts in knowledge, attitudes, and/or intentions toward sun protective behaviors following program intervention.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Setting and Sample

The EBP project was implemented at a local middle school located within Porter County Indiana, a small rural community with a population of approximately 3,700 residents. Permission for project implementation was obtained from the school principal, school nurse, and seventh and eighth grade science teachers in May 2012. Upon Valparaiso University (VU) Institutional Review Board (IRB) approval, a complete listing of all students enrolled in seventh and eighth grade science class from August, 2012 to December, 2012 was retrieved from the school's science teachers. Dates and times for implementation were scheduled upon the project coordinator's first meeting with science teachers at the start of the school year in late August 2012. The program was implemented during the month of September to access students at a time when the weather was still warm in the Midwest, allowing ample opportunity for students to apply the behaviors learned. September was also identified as a convenient time for the teachers implementing this project, with flexibility integrating such curriculum into existing lesson plans near the start of the school year.

A convenience sample of all middle school students enrolled in seventh and eighth grade science classes during the fall 2012 semester were eligible to participate in the project. The anticipated number of participants was 180, based on estimates of approximately 90 students per grade level enrolled within this school system. All students enrolled in seventh and eighth grade science received the educational component of the sun safety program Healthy Skin is IN, because school advocates established that the material was of value to the entire population. Students were eligible to participate in the skin viewing activity and survey portion of the program if they could read English and had parental consent (see Appendix D) and child assent forms (see Appendix E) returned to their designated science teacher prior to the

deadline of September 7, 2012. Students were excluded from participation in the skin viewing activity and completion of the survey forms if they could not read English, failed to return parental consent and child assent forms by September 7, 2012 or declined participation in the activities. Students not participating in the questionnaire or the F-102 skin viewing activities were provided the option of spending more time on other in-class activities described within the interventions section of this chapter.

Outcomes

A descriptive, within-group pre-test/post-test design was used to assess the effectiveness of the multifaceted school-based sun safety education program Healthy Skin is IN. Three major outcomes were evaluated within this EBP project. Consistent with the supporting evidence, the primary outcome of interest within this project was an improvement in knowledge of sun safety and sun-protective behaviors. Additionally, as a result of improvements in knowledge, positive changes in sun-protective attitudes and intentions to practice sun-protective behaviors were examined.

Intervention

The project coordinator provided two 50-minute consecutive educational sessions during seventh and eighth grade science classes at the middle school during September 2012. The program incorporated a live narration, nurse practitioner-led PowerPoint presentation (see Appendix C) including multimedia content (e.g., video clips) from the SCF and the U.S. Food and Drug Administration (FDA). An interactive approach to providing the educational material was utilized. A cardboard informational sunscreen cube was gently tossed to students participating in discussion. Students were encouraged to toss the cube to their peers to motivate participation in the class content. In-class activities focusing on the impact of UV radiation were utilized during the second class session following completion of the PowerPoint presentation. Solar detecting items (i.e., UV sensitive Frisbees and bracelets) were provided. Students were monitored by the project coordinator and their teachers while taking these items outside to note

color changes under various conditions including different levels of shade and sunscreen protection.

Students had the option to participate in a self-viewing activity using a skin analyzer device to evaluate signs of skin damage from the sun. Children also had the opportunity to share viewing of the skin with their peers by utilizing the two-way screen within the device. Peer-viewing was encouraged because such activities were thought to promote peer discussion and help establish a pro-sun protection social norm among adolescents (Olson et al., 2008). Such filtered fluorescent light devices have been used frequently by dermatologists and healthcare providers at local health fairs to demonstrate sun damage to the skin. The F-102 skin viewing device utilized low-wattage (no greater than 10 watt lamps) fluorescent lighting, a mirror, and a two-way viewing screen to highlight pigmentation changes on the face as a result of sun exposure. This portable device provided a darkened environment to view skin changes not visible under normal light.

The F-102 skin viewing device had received approval of use through stamps of RoHS (restriction of hazardous substances) and CE (European conformity) certification by European standards. CE marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation, which ensures consumer safety (Export.gov, 2012). RoHS marking stands for the restriction of the use of certain hazardous substances in electrical and electronic equipment in Europe (Export.gov, 2012). Additionally, the FDA (2012) has reported that these devices "carry no warnings at typical use distances". As a precaution, the FDA (2012) recommends that these types of devices not be used at distances closer than one foot, for more than one hour per day. The use of the F-102 viewing device for purposes of this project was at a distance of approximately one foot for approximately three minutes per participant, fully adhering to the FDA safety guidelines on fluorescent lighting.

Information on an optional poster competition (see Appendix F) to demonstrate what was learned during the program was available to the students. Posters were designed to be displayed at either the elementary or high school building depending on which audience the student chose to impact with their message. Poster development was encouraged as a method to raise awareness about sun safety in the community. Other community members (i.e., parents, grandparents, siblings) would have the opportunity to view these posters during after school activities and sporting events. Students were encouraged to create a poster either (a) teaching elementary age children about sun safe behaviors or (b) teaching high school age children about the risks of ultraviolet radiation and tanning bed use. One winner from each grade was selected by the science teachers at the completion of the program through use of the poster competition criteria form (see Appendix F). Each winner was awarded a beach cabana tent, valued at \$59, purchased by the project coordinator through scholarship funding.

Informational packets including a follow up letter for parents (see Appendix G) and handouts, brochures, and educational materials from the ACS and the SCF (contact project coordinator for copies of these materials) were distributed at the conclusion of the program for students to take home. Upon authorization from the school principal and school nurse, donated sunscreen samples and SPF lip balm was administered for all students. Sunscreen samples and lip balm were donated by companies dedicated to community health promotion including Blue Lizard®, Neutrogena®, and CVS®. The follow up letter for parents, sunscreen samples, and educational brochures/pamphlets were delivered to students in trendy sport tote bags donated by CVS Minute Clinic®, a local community sponsor and employer of the project coordinator.

Policy change recommendations (see Appendix H) and examples of school policies implemented in sun safe school systems, were provided to the administrators at the middle school to encourage the support of a sun safe school environment. These recommendations were developed using guidelines from the CDC and WHO. Recommendations included (a)

formulating and revising policies which support the addition of shade structuring on school grounds, (b) promoting the application of sunscreen by students while at school, and (c) encouraging the use of school approved protective clothing such as hats or sunglasses during recess and outdoor activities. Such policies have been prepared to share with the school board and parent teacher association for consideration.

Sun safety posters from the SCF, with appearance-focused messages, were displayed throughout the middle school in bathrooms, lunchrooms, and hallways during the month of implementation to reinforce the healthy behaviors taught during the class sessions. Sun safety educational brochures and materials were available to all middle school staff in the staff lounge areas. Gym teachers and coaches were encouraged to use the educational information during and following project implementation with aims of enforcing sun safe behaviors while outdoors during physical education class and participation in sports activities. Cross-curricular activities for students in grades seven and eight from the SunWise school program were printed and available to all middle school teachers, to encourage an integrative approach to sun-safety education.

Planning

An introductory letter (see Appendix I) including the expectations of the science teachers during project implementation, a copy of the Power Point presentation (see Appendix C), and class curriculum outline (see Appendix B) were sent to the science teachers in August, just prior to the start of their contract days for the 2012 school year. The objective of this letter was to secure dates for project implementation during the month of September at the convenience of the teachers and to gain approval of the developed sun safety content. The science teachers were asked to sign and return a teacher approval form (see Appendix J), acknowledging their review and approval of the course content, prior to implementation in the classroom. Signature on the teacher approval form implied that the teacher was willing to assist the project coordinator in the following ways: (a) approving the course curriculum and PowerPoint

presentation, (b) assisting with selecting dates for project implementation to reach all seventh and eighth grade students, (c) administering a letter of interest for parents to all students at the start of the school year, (d) collecting parent/guardian consent and child assent forms by September 7, 2012 in the provided sealed envelope, (e) assisting with PowerPoint and Internet access in the classroom during the class sessions, (f) assisting with selecting a date for project evaluation four weeks following the program, (g) assisting with helping students during in-class activities such as with UV detecting items, and (h) selecting a grand prize poster winner from each grade. The school nurse and site facilitator were also provided with the course materials for review with the principal prior to implementation.

Recruiting Sample

In addition to the previously detailed educational information, a letter of interest to parents (see Appendix K) was sent home with all students at the start of the school year through their designated science teacher. The purpose of the letter was to inform parents about the sun safety educational program including the project goals and interventions utilized. The appropriate number of copies of this letter, consent, and assent forms were provided to the science teachers upon their first meeting with the project coordinator in August 2012. The letter of interest provided details about the project including a description of the course content, in-class activities, consent form (see Appendix D) and assent form (see Appendix E). Parents were instructed that the completed parental consent and child assent forms had to be returned to their child's designated science teacher by September 7, 2012 in order for the student to be able to participate in the project survey and skin viewing activities. Furthermore, science teachers reminded students at the beginning of the due date week to return the parental consent and assent forms for participation in select project activities. Science teachers were provided with a sealed envelope to collect returned consent and assent forms prior to the implementation date. The envelopes were collected by the project coordinator at the conclusion of the school day on September 7, 2012.

Data Measures and their Reliability and Validity

Following the collection of parental consent and child assent forms, students were asked to participate in a pre-test survey (see Appendix L) which included demographic information and measured knowledge, attitudes, practices, and intended practices on sun safety. The survey was administered immediately before program implementation at a time that was convenient for the seventh and eighth grade science teachers. The survey was an adaptation from questionnaires developed by Buller, Reynolds, et al. (2006) and Gellar, Rutsch, Kenausis, and Zhang (2003) who provided permission for use in this project. Content was adapted to more appropriately fit the targeted population. Content validity was established by a local pediatrician (see Appendix M) after a thorough review of the initial and adapted tool. An option response of “I Don’t Know” in addition to the “True” and “False” response was included in the pre-test/post-test questionnaire. The intent was to avoid or minimize the chance of obtaining inaccurate information from the participants. The readability and timing of the questionnaire forms was piloted among children, within seventh and eighth grade attending a school not participating in this project, prior to implementation. Based on feedback from this group, no modifications were warranted. The questionnaire was found to take approximately 5 to 10 minutes to complete. Post-test surveys were similar to the pre-test survey, with intentions to measure knowledge, attitudes, and behaviors. Post-test survey 1 (see Appendix N) was administered the day following the final class session and post-test survey 2 (see Appendix O) one month following the program completion.

Data Collection

The project coordinator obtained a listing of all students enrolled in seventh and eighth grade science from science teachers prior to the program start date. All students were randomly assigned a number from 1 to 180 by pulling names from a hat. The Survey Code Sheet (see Appendix P) was used by the project coordinator to summarize and track all students’ full names with their randomly assigned identification numbers. Surveys had the student’s pre-

assigned identification number printed upon the forms (i.e., 1 to 180) and this number was used to identify the student and compare individual outcomes at the completion of the program. Questionnaires were administered to students in a sealed envelope labeled with their name on the front which was used to conceal student's assigned identification number on the survey form. Student identification numbers rather than names were printed on the survey forms. Students were instructed by the project coordinator to complete the entire questionnaire and return this document to the front of the classroom in the sealed box labeled "surveys" which had a small slit opening for students to deposit their forms. The "survey" box was placed near the area where the project coordinator was seated. The students were instructed to discard the envelopes upon opening. Survey data was kept by the project coordinator in a separately locked file within the coordinator's home.

Data Management and Analysis

The survey code sheet was not taken to the school at any point in time and was stored in a locked file within the coordinator's home to ensure confidentiality. Student names and other identifying information were not associated in any publication or presentation of the information evaluated for this project. Data was treated as confidential and only reporting of group data occurred when disseminating findings. Data analysis and the project evaluation were written after the collection of data was complete.

Protection of Human Subjects

The student participants in this project were considered a vulnerable population. Review, feedback, and approval for the EBP project was obtained from the Valparaiso University Institutional Review Board (IRB) prior to implementation. Parent consent and child assent forms written at a sixth grade reading level containing explanations of the project purpose, procedures, risks, benefits, voluntary participation/withdrawal, and confidentiality were distributed to all participants and their parents/guardians. Parental consent and child assent was obtained prior to participation in the survey or skin viewing activities within the program. Contact information

was provided and participants and their parent/guardians were encouraged to contact the project coordinator at any time with questions or concerns. The proposed project did not intend to use any procedures on human subjects; rather, information was gathered from a pre-test-post-test survey to measure the effectiveness of the interventions. There were no known physical risks to participating in this project and no invasive techniques were utilized. The F-102 Skin Scanner Analyzer device was only operated by the project coordinator and was useful as an observation method to view existing sun-related skin damage on the face.

This project did not pose any physical, psychological, or social risks to the participants, parents, staff, or the community. Parents and children did not receive any stipend for participation in the project; rather, they were provided the benefit of the knowledge that the program could potentially increase their use of sun safe behaviors and minimize their chances of developing skin cancer in the future. The school systems may benefit from project participation if the data findings are used in the future to revise policies to support sun safe behaviors in the school environment and mandate the implementation of sun safe education across all grade levels.

CHAPTER 4

FINDINGS

Healthy Skin is IN was developed to provide an evidence-based approach to educating adolescents about sun safety within a local middle school in Northwest Indiana. The project coordinator developed this program to determine if a multifaceted sun safety intervention would positively impact adolescents' knowledge, attitudes, and/or intentions to practice sun protective behaviors. The following data analyses detail project outcomes and compare the effectiveness of the sun safety program to the previous standard consisting of no formal sun safety education within this middle school setting.

Sample Characteristics

At the time of project implementation, 169 students were enrolled in the seventh and eighth grades at the local middle school selected for project implementation and eligible to participate in all aspects of the multifaceted project intervention. Of the 169 students who received the educational component that was adopted into the science curriculum, 142 had consent/assent to complete the questionnaires and participate in the skin viewing activities. Only 125 students completed all three versions of the forms including pre-test, post-test 1, and post-test 2. Seventeen students were missing a portion of the questionnaire forms as a result of absence from class on the day of questionnaire administration and were excluded from further data analysis; fifteen of these seventeen students provided demographic data.

To address potential bias within this project, comparison of demographic variables was made between those lost to attrition and those who remained in the project. An independent-samples *t*-test was calculated comparing the mean age of participants ($n = 125$) who completed all three questionnaires to the mean age of those who did not complete all three questionnaires, but provided demographic information ($n = 15$). The mean age of those completing all three questionnaires ($M = 12.82$, $SD = .734$) was not statistically different ($p > .05$) from the mean age

of those not completing all three questionnaires ($M = 13.13$, $SD = .91$). Chi-square tests were calculated comparing the demographics of students who completed all three questionnaires to those who did not. No significant relationship was found for race ($X^2 = 2.501$, $p > .05$), grade ($X^2 = 2.031$, $p > .05$), gender ($X^2 = .002$, $p > .05$), skin type ($X^2 = 1.540$, $p > .05$), self-reported sunburns ($X^2 = 1.818$, $p > .05$) or hair type ($X^2 = 6.910$, $p > .05$) between the two groups. Therefore, the group of students completing all three questionnaires was found to be representative of the middle school's students exposed to the educational program. This group of 125 participants was used within all further evaluation methods to maintain consistency for this project analysis.

The 125 students who completed all three questionnaires essential to the evaluation of this EBP project were comprised of 37.6% 12 year olds, 43.2% 13 year olds, and 19.2% 14 year olds. Overall participation was similar in boys ($n = 59$) and girls ($n = 66$) and by grade distribution, 7th grade ($n = 66$) and 8th grade ($n = 59$). The participants were predominately White (85.5%), however 8.9% were Hispanic, 1.6% were Black, and 4% were of American Indian ethnicity. Dark brown hair color was most frequently reported among the participants (41.6%), followed closely by dark blonde or light brown (38.4%); those with blonde hair (11.2%), red or light blonde hair (4.8%), and black hair (4%) constituted a smaller portion of participants. A significant portion of students (46%) reported a skin type which sometimes burns/always tans ($n = 57$), however 4.8% reported always burns/never tans ($n = 6$), 14.5% reported always burns/sometimes tans ($n = 18$), 24.2% reported never burns/always tans ($n = 30$), and 10.5% identified their skin type as unknown ($n = 14$) (see Figure 4.1). Additionally, when asked about the number of sunburns experienced over the last summer season, the majority (63.2%) of respondents reported one or two sunburns ($n = 79$), 14.4% reported three or more sunburns ($n = 18$), and 22.4% reported none ($n = 28$).

Self-reported baseline data on sun-protective behaviors over the previous summer season were not surprising for this age group. When asked if the student wore protective clothing (i.e., hat or long-sleeved shirt), 41.6% reported never, 25.6% reported rarely, 27.2% reported sometimes, 3.2% reported often, and 2.4% reported always. The use of sunglasses while exposed to the sun over the previous summer was reported by 18.4% as never; 16.8% reported rarely, 30.4% responded sometimes, 24.8% responded often, and 9.6% reported always. Exposure to the sun between the peak hours of UV intensity (10 a.m. to 4 p.m.) was reported as 2.4% never, 7.2% rarely, 22.4% sometimes, 42.4% often, and 25.6% always. When asked if the student wore sunscreen over the last summer, 25.6% reported never, 34.4% reported rarely, 26.4% reported sometimes, 8.8% reported often, and 4.8% reported always. Many students (40.8%) denied “laying out” in the sun to get a tan during the month prior to project implementation, however 19.2% reported sometimes, 17.6% reported rarely, 17.6% reported often, and 4.8% reported always. In regards to use of a tanning bed or sunlamp to get a tan during the month prior to implementation, 1.6% of respondents reported always, 2.4% sometimes, 0.8% rarely, and a substantial 95.2% reported never. Demographic characteristics of those completing all three project questionnaires are shown in Table 4.1, and self-reported sun safety behaviors over the previous summer by gender are shown in Table 4.2.

Instrument Reliability

Questionnaires utilized within this project were adapted with permission from previous tools measuring sun-related knowledge, attitudes, and behavior within similar project designs (Buller, Reynolds et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003). Buller, Reynolds et al. (2006) reported a Kuder-Richardson reliability of 0.71 for the summed knowledge variables within their instrument. According to Buller, Reynolds et al. (2006), kappa values estimating 2-week test-retest reliability were 0.39 for knowledge, 0.67 for attitudes, and 0.54 for self-efficacy ($p < 0.0001$ for all three variables). Buller, Reynolds et al. also (2006) stated that “although the test-retest reliability and the internal consistency for knowledge were low, concordance rates

were high (82% to 93%)” (p 15). Although, internal consistency has not always been indicative of quality scales, these reliability values were similar to those reported by Hewitt, Denman, Hayes, Pearson, and Wallbanks (2001), within another relevant study on sun safety education. The second group of researchers, Geller, Rutsch, Kenausis, and Zhang (2003), from which permission for instrument use was obtained, had established content validity and reliability established by expert opinion, and their tool was also piloted and time-tested in children. Reliability of the adapted tools supported within the literature provided a solid foundation for the use of the instruments developed within this EBP project.

Changes in Outcomes: Statistical Testing and Significance

The primary goal of this EBP project was to improve the knowledge of sun safety and sun-protective behaviors of adolescents exposed to a school-based sun-safety program. Additionally, the project aimed to positively change the sun related attitudes and behavioral intentions of the exposed participants. The multifaceted sun safety program resulted in improved scores among the three focused variables of knowledge, attitude, and behavior; thus the EBP project results supported the PICO question.

To determine the effectiveness of the Healthy Skin is IN program, one-way repeated-measures ANOVA tests were calculated comparing the mean scores of participants' knowledge, behaviors, and attitudes at three different times: pre-test, post-test 1, and post-test 2. All statistical testing was conducted using commercially available software (PASW [Predictive Analytics Software] Statistics 21). Paired-samples *t*-tests were used as a means of post-hoc analysis to further evaluate significant ANOVA results (Cronk, 2012). Chi-square analyses were also used to compare differences among variables of interest: gender, race, skin type, grade, hair color, and history of sunburns. Statistical significance for all analyses was established as $p < .05$.

Knowledge.

Overall, the sun safety program was effective at increasing the knowledge level of adolescents' exposed. Furthermore, participants demonstrated not only an increase in knowledge, but the ability to retain this new knowledge over time. In pre- and post-test questionnaires, a total score was calculated by the number of correct items (score of 2) and incorrect items (score of 1), with "not sure" coded as an incorrect answer. There were a total of nine knowledge questions with a possible range of scores from 9 to 18. A histogram comparison showing the distribution of scores between pre-test, post-test 1, and post-test 2 is depicted in Figure 4.2. Regardless of gender, grade, age, or number of reported sunburns over the previous summer season, all nine knowledge questions demonstrated significance ($p < .001$) increases in number of correct responses from pre-test to post-test 1 ($p < .001$) and pre-test to post-test 2 ($p < .001$). At pre-test 53.7% of students responded correctly to the question "Do you think you could get a sunburn even on a cloudy day?", which increased to 91.9% correct responses at post-test 2. Sunscreen questions, such as "a SPF of 2 will prevent a sunburn longer than a SPF of 15", received 61.5% correct responses at pre-test, which increased to 91.9% correct at post-test 2. See Table 4.4 for a comparison of participants' knowledge scores before and after the intervention according to each question. A one-way repeated-measures ANOVA was calculated comparing the mean knowledge scores of participants at pre-test, post-test 1, and post-test 2. A significant effect was found ($F(2, 238) = 177.98, p < .001$). Follow up protected t -tests revealed that scores increased significantly from pre-test ($M = 15.24, SD = 1.76$) to post-test 1 ($M = 17.34, SD = 0.87$) and from pre-test ($M = 15.24, SD = 1.76$) to post-test 2 ($M = 17.42, SD = 0.84$). No significant difference ($p > .05$) existed from post-test 1 ($M = 17.34, SD = 0.87$) to post-test 2 ($M = 17.43, SD = 0.84$) (see Table 4.3); thus, changes in knowledge persisted over time. Frequencies for select sample characteristics on total knowledge scores are presented in Table 4.5.

Attitudes.

This EBP project positively influenced adolescent sun-related attitudes, including the perceived importance and healthiness of a tan and likelihood of getting skin cancer as an adult. Not surprising, and similar to the knowledge outcomes, these attitudes remained consistent among participants over time. There were three questions related to attitude on the questionnaires with a possible range of scores from 3 to 6. “Yes” responses were scored as 1 and “no” responses were scored as 2 (see Table 4.6). When asked if the student felt it was important to have a sun tan, “yes” responses shifted from 44.4% at pre-test to 29.6% at post-test 2, demonstrating more negative attitudes toward the importance of tanning following the intervention. “Yes” responses to whether students felt a suntan was good for them, decreased from 34.1% at pre-test to 15.2% at post-test 2, again supporting the positive shifts in attitudes about suntans. The final question measured the perceived susceptibility of the student’s chances of developing skin cancer in the future, asking “Do you think that you have a chance of getting skin cancer when you are older?” Minimal change was noted among this variable, with 33.6% responding “yes” at pre-test to 35.2% at post-test 2. A histogram comparison showing the distribution of attitude scores between pre-tests and post-tests is presented in Figure 4.3. A one-way repeated-measures ANOVA was calculated comparing the mean attitude scores of participants at pre-test, post-test 1, and post-test 2. A significant effect was found ($F(2, 214) = 13.98, p < .001$). Follow up protected t -tests revealed that attitude scores increased significantly from pre-test ($M = 4.88, SD = .94$) to post-test 1 ($M = 5.26, SD = .75$) and from pre-test ($M = 4.88, SD = .94$) to post-test 2 ($M = 5.20, SD = .76$). No significant difference ($p > .05$) was found between post-test 1 ($M = 5.26, SD = .75$) and post-test 2 ($M = 5.20, SD = .76$) (see Table 4.3); thus, changes in attitude also persisted over time. Frequencies for select sample characteristics on total attitude scores are presented in Table 4.7.

Behavioral intentions.

Healthy Skin is IN significantly shifted adolescent intentions to practice sun-protective behaviors: wearing sunscreen, avoiding the outdoors during the peak hours of UV intensity, wearing protective clothing and sunglasses, and avoiding tanning bed use (see Figure 4.4). Behavior responses were summed using the following method to evaluate the Likert scale questions, “no” scored a 0, “probably not” scored as 1, “most likely” scored as 2, and “yes” scored as 3. Behavior scores ranged from 0 to 15 and the higher the score, the more positive the shift in intentions to change sun-protective behaviors. Regardless of gender, grade, age, or number or reported sunburns over the previous summer season, scores significantly shifted from pre-test to post-test 2 ($p < .001$). At pre-test and post-test the seventh grade students scored ($M = 8.86$, $SD = 2.14$ and $M = 9.51$, $SD = 2.57$) higher than the eighth grade students ($M = 7.74$, $SD = 2.05$ and $M = 8.37$, $SD = 2.50$). Most significant differences from pre-test to post-test 2 (when comparing students reported sunburn behavior scores), were found among those who reported “one or two” ($p < .001$) or “three or more” ($p < .05$) sunburns over the previous summer season. Table 4.8 presents the frequencies for select sample characteristics on total behavior scores. A one-way repeated-measures ANOVA was calculated comparing the behavioral intentions of participants at pre-test, post-test1, and post-test 2. A significant effect was found ($F(2, 240) = 34.43$, $p < .001$). Follow up protected t -tests revealed that there was a significant difference ($p < .001$) from pre-test ($M = 15.24$, $SD = 1.76$) to post-test 1 ($M = 17.34$, $SD = .87$), post-test 1 ($M = 17.34$, $SD = .87$) to post-test 2 ($M = 17.43$, $SD = .84$), and from pre-test ($M = 15.24$, $SD = 1.76$) to post-test 2 ($M = 17.43$, $SD = .84$) (see Table 4.3). Pre-intervention reported sunscreen use increased from 25.6% “never” and 34.4% “rarely” to 38.7% “most likely” and 33.9% “yes” in response to intentions to use sunscreen over the next summer season. Comparisons of participants’ behavioral intentions before and after the intervention according to the question are reported in Table 4.9.

Figure 4.1

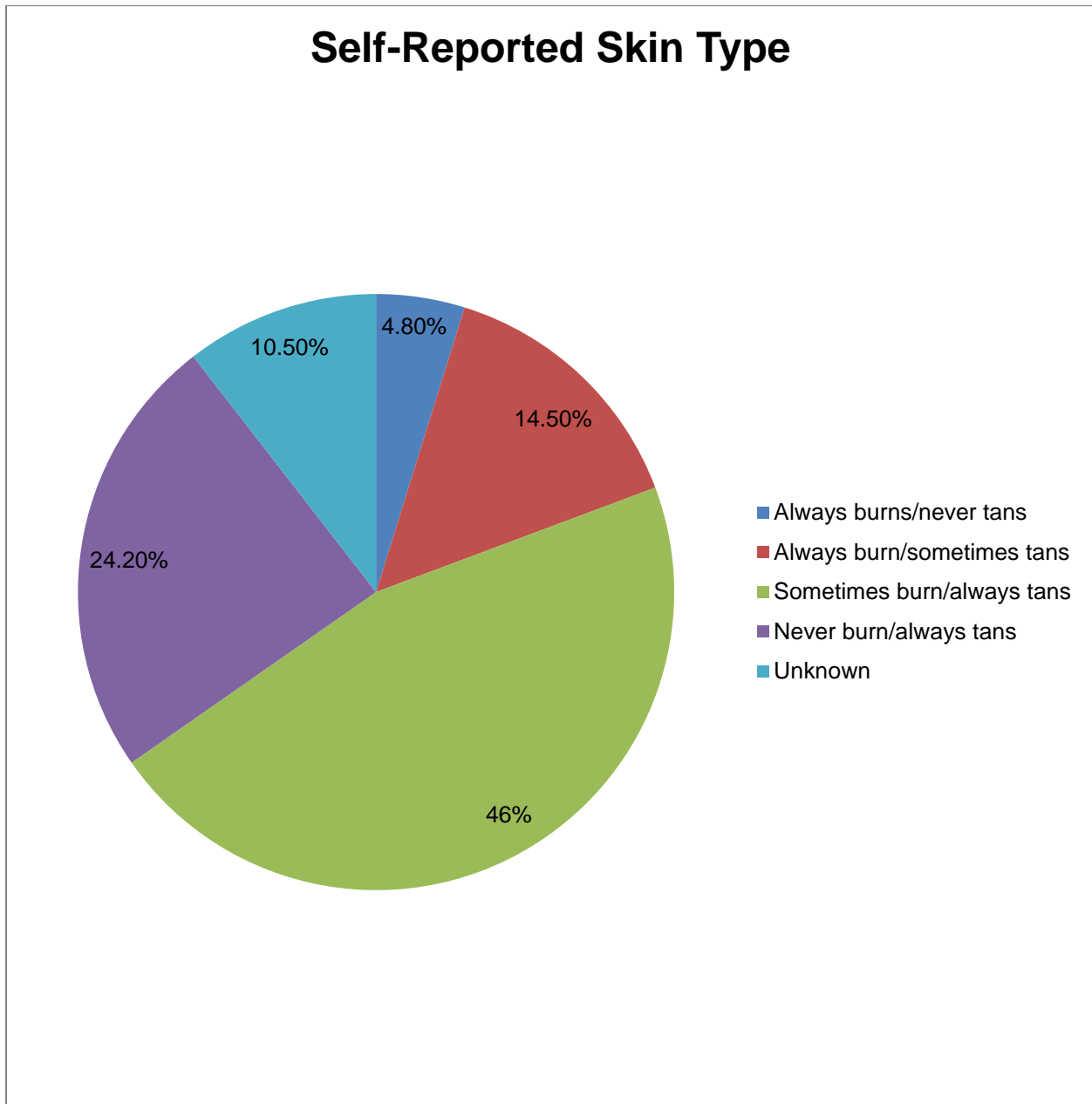


Table 4.1

Demographics of Sample Characteristics.

Characteristics	Frequency (%)	Mean
Gender (N=125)		
Male	59 (47.2)	
Female	66 (52.8)	
Age in years (N=125)		
		12.82 (SD = .734)
12	47 (37.6)	
13	54 (43.2)	
14	24 (19.2)	
Grade (N = 125)		
7	66 (52.8)	
8	59 (47.2)	
Race (N=124)		
Hispanic	11 (8.9)	
White	106 (85.5)	
Black	2 (1.6)	
American Indian	5 (4.0)	
Skin Type (N = 124)		
Always burns/never tans	6 (4.8)	
Always burns/sometimes tans	18 (14.5)	
Sometimes burns/always tans	57 (46.0)	
Never burns/always tans	30 (24.2)	
Unknown	13 (10.5)	

(continued)

Table 4.1 (continued)

Demographics of Sample Characteristics. (continued)

Characteristics	Frequency (%)	Mean
Hair Color (<i>N</i> = 125)		
Red or light blonde	6 (4.8)	
Blonde	14 (11.2)	
Dark blonde or light brown	48 (38.4)	
Dark brown	52 (41.6)	
Black	5 (4.0)	
Reported Sunburns (<i>N</i> = 125)		
None	28 (22.4)	
One or two	79 (63.2)	
Three or more	18 (14.4)	

Table 4.2

Self-Reported Behaviors over Previous Summer (2012) by Gender.

Males (N = 59), Females (N = 66)

Reported in Frequency (%)

	Never	Rarely	Sometimes	Often	Always
Protective Clothing					
Males	13 (22.0)	14 (23.7)	25 (42.4)	4 (6.8)	3 (5.1)
Females	39 (59.1)	18 (27.3)	9 (13.6)	_____	_____
Sunglasses					
Males	16 (27.1)	8 (13.6)	16 (27.1)	12 (20.3)	7 (11.9)
Females	7 (10.6)	13 (19.7)	22 (33.3)	19 (28.8)	5 (7.6)
Peak UV Hours					
Males	3 (5.1)	5 (8.5)	13 (22.0)	21 (35.6)	17 (28.8)
Females	_____	4 (6.1)	15 (22.7)	32 (48.5)	15 (22.7)
Sunscreen Use					
Males	20 (33.9)	15 (25.4)	15 (25.4)	5 (8.5)	4 (6.8)
Females	12 (18.2)	28 (42.4)	18 (27.3)	6 (9.1)	2 (3.0)
“Laid out”					
Males	40 (67.8)	9 (15.3)	6 (10.2)	3 (5.1)	1 (1.7)
Females	11 (16.7)	13 (19.7)	18 (27.3)	19 (28.8)	5 (7.6)
Tanning Bed Use					
Males	55 (93.2)	1 (1.7)	1 (1.7)	_____	2 (3.4)
Females	64 (97.0)	_____	2 (3.0)	_____	_____

Figure 4.2

Histogram Comparison Showing the Distribution of Knowledge Scores Between Pre-test, Post-test 1, and Post-test 2.

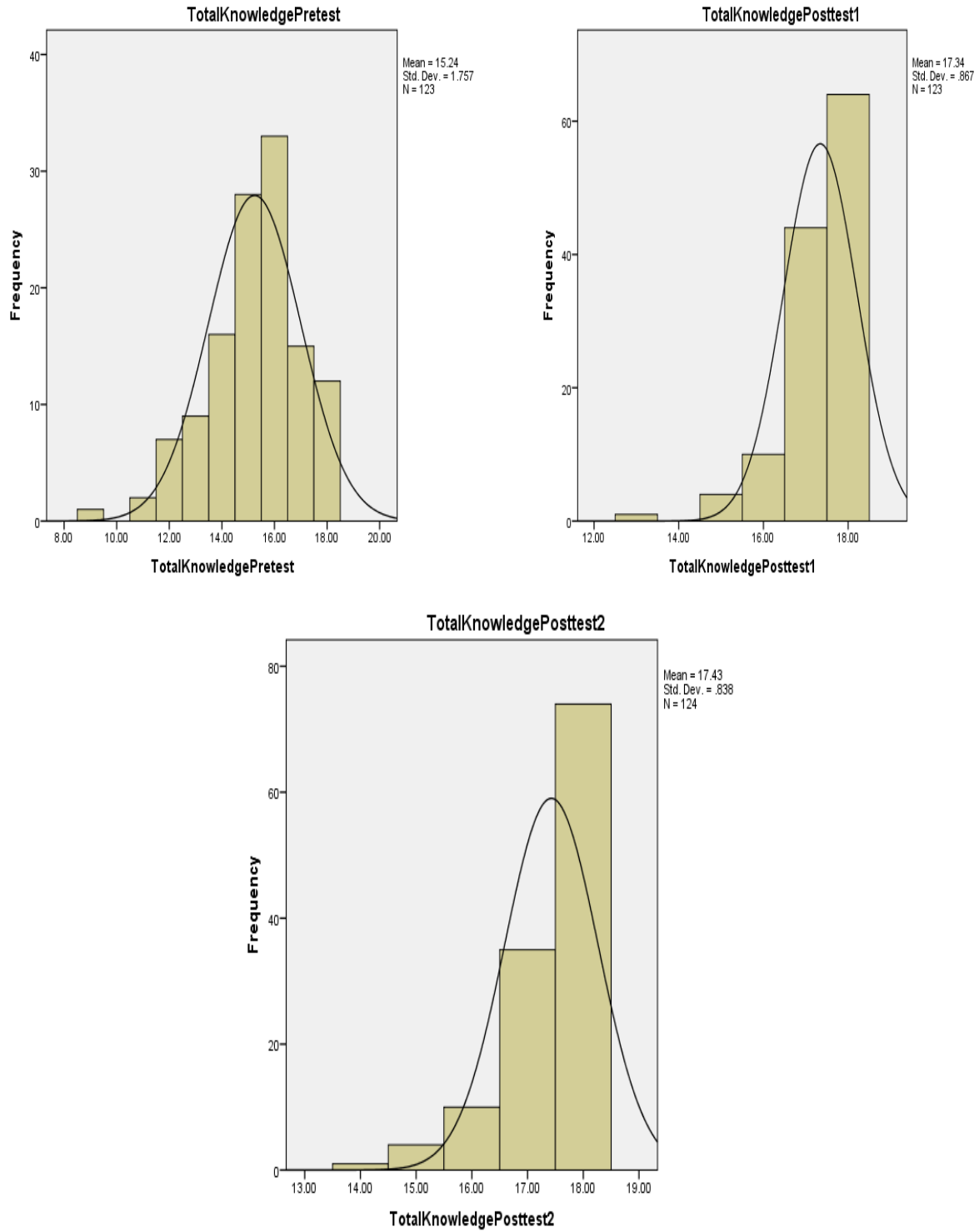


Table 4.3

Comparison of Knowledge, Attitudes, and Behavioral Intent Mean Scores Before and After the Intervention.

Knowledge (Range 9-18)	<i>Mean</i>	<i>SD</i>	Significance (<i>p</i> value)
Pretest (<i>n</i> = 123)	15.24	1.76	
Posttest1 (<i>n</i> = 123)	17.34	.87	
Posttest2 (<i>n</i> = 124)	17.43	.84	
Pretest to Posttest1			<i>p</i> < .001
Pretest to Posttest2			<i>p</i> < .001
Behavioral Intentions (Range 0-15)			
Pretest (<i>n</i> = 123)	8.34	2.16	
Posttest1 (<i>n</i> = 124)	9.85	2.65	
Posttest2 (<i>n</i> = 124)	8.97	2.59	
Pretest to Posttest1			<i>p</i> < .001
Pretest to Posttest2			<i>p</i> < .001
Attitudes (Range 3-6)			
Pretest (<i>n</i> = 121)	4.88	.94	
Posttest1 (<i>n</i> = 110)	5.26	.75	
Posttest2 (<i>n</i> = 125)	5.20	.76	
Pretest to Posttest1			<i>p</i> < .001
Pretest to Posttest2			<i>p</i> < .001

Table 4.4

Comparison of Participants' Knowledge Scores Before and After the Intervention According to the Question.

	Correct (%)	Significance	Incorrect (%)	Not Sure (%)
Q1. A sunscreen with a sun protection factor (SPF) of 2 will prevent a sun burn longer than a SPF of 15.				
Pretest (<i>n</i> = 122)	61.5		9.8	28.7
Posttest1 (<i>n</i> = 123)	90.2		8.1	1.6
Posttest2 (<i>n</i> = 124)	91.9		4.8	3.2
Pretest-Posttest2		$p < .001$		
Q2. It is recommended that you put on sunscreen only once a day and then not reapply it.				
Pretest (<i>n</i> = 123)	76.4		5.7	17.9
Posttest1 (<i>n</i> = 123)	95.9		3.3	.8
Posttest2 (<i>n</i> = 124)	96.0		1.6	2.4
Pretest-Posttest2		$p < .001$		
Q3. It is most harmful to your skin to be in the sun between 10:00 a.m. and 4:00 p.m.				
Pretest (<i>n</i> = 123)	63.4		11.4	25.2
Posttest1 (<i>n</i> = 123)	97.6		1.6	.8
Posttest2 (<i>n</i> = 124)	97.6		.8	1.6
Pretest-Posttest2		$p < .001$		
Q4. You can get a sun burn even on a cloudy day.				
Pretest (<i>n</i> = 123)	53.7		28.5	17.9
Posttest1 (<i>n</i> = 122)	93.4		4.9	1.6
Posttest2 (<i>n</i> = 124)	91.9		4.8	3.2
Pretest-Posttest2		$p < .001$		
Q5. People with light colored skin are at lower risk for getting skin cancer than people with darker colored skin.				
Pretest (<i>n</i> = 123)	54.5		8.9	36.6
Posttest1 (<i>n</i> = 122)	82.0		14.8	3.3
Posttest2 (<i>n</i> = 124)	80.6		12.1	7.3
Pretest-Posttest2		$p < .001$		(continued)

Table 4.4 (continued)

Comparison of Participants' Knowledge Scores Before and After the Intervention According to the Question.

	Correct (%)	Significance	Incorrect (%)	Not Sure (%)
Q6. Getting a lot of sunburns increases your chances of getting skin cancer.				
Pretest (<i>n</i> = 123)	79.7		6.5	13.8
Posttest1 (<i>n</i> = 123)	95.9		2.4	1.6
Posttest2 (<i>n</i> = 124)	99.2		.8	—
Pretest-Posttest2		<i>p</i> < .001		
Q7. Tanning beds are a safe way of getting a tan.				
Pretest (<i>n</i> = 123)	83.7		4.1	12.2
Posttest1 (<i>n</i> = 123)	99.2		.8	—
Posttest2 (<i>n</i> = 124)	97.6		.8	1.6
Pretest-Posttest2		<i>p</i> < .001		
Q8. People cannot die from skin cancer.				
Pretest (<i>n</i> = 123)	78.9		7.3	13.8
Posttest1 (<i>n</i> = 123)	93.5		5.7	.8
Posttest2 (<i>n</i> = 124)	91.9		4.8	3.2
Pretest-Posttest2		<i>p</i> < .001		
Q9. Too much sunlight can cause skin cancer.				
Pretest (<i>n</i> = 123)	78.9		2.4	18.7
Posttest1 (<i>n</i> = 123)	92.7		5.7	1.6
Posttest2 (<i>n</i> = 124)	95.2			
Pretest-Posttest2		<i>p</i> < .001		

Note: Statements were adapted with permission from Buller, Reynolds et al. (2006) and Geller, Rutsch, Kenausis, & Zhang (2003).

Table 4.5

Frequencies for Select Sample Characteristics on Total Knowledge Scores.

Reported in *M (SD)*. (Minimum score 9; maximum score 18)

	Pretest	Post-test 1	Post-test 2	Pretest-Posttest2 Significance (<i>p</i> value)
Gender				
Female	15.61 (1.50)	17.45 (.73)	17.50 (.73)	<i>p</i> < .001
Male	14.82 (1.95)	17.22 (.99)	17.34 (.95)	<i>p</i> < .001
Grade				
7	15.06 (1.83)	17.36 (.88)	17.43 (.77)	<i>p</i> < .001
8	15.46 (1.66)	17.31 (.86)	17.42 (.91)	<i>p</i> < .001
Age				
12	15.25 (1.70)	17.52 (.59)	17.53 (.72)	<i>p</i> < .001
13	15.36 (1.81)	17.30 (1.03)	17.43 (.80)	<i>p</i> < .001
14	14.96 (1.80)	17.08 (.88)	17.21 (1.10)	<i>p</i> < .001
Reported Sunburns				
None	15.57 (1.81)	17.18 (1.16)	17.44 (.85)	<i>p</i> < .001
One or two	15.18 (1.74)	17.41 (.73)	17.46 (.84)	<i>p</i> < .001
Three or more	15.00 (1.78)	17.29 (.92)	17.28 (.83)	<i>p</i> < .001

Table 4.6

Comparison of Participants' Attitudes Before and After the Intervention According to the Question.

Reported in Frequency (%)

	Yes (%)	No (%)
Q1. Do you feel it is important to have a sun tan?		
Pre-test (<i>n</i> = 124)	55 (44.4)	69 (55.6)
Post-test1 (<i>n</i> = 124)	35 (28.2)	89 (71.8)
Post-test2 (<i>n</i> = 125)	37 (29.6)	88 (70.4)
Q2. Do you think a suntan is good for you?		
Pretest (<i>n</i> = 123)	42 (34.1)	81 (65.9)
Posttest1 (<i>n</i> = 124)	12 (9.7)	112 (90.3)
Posttest2 (<i>n</i> = 125)	19 (15.2)	106 (84.8)
Q3. Do you think that you have a chance of getting skin cancer when you are older?		
Pretest (<i>n</i> = 122)	41 (33.6)	81 (66.4)
Posttest1 (<i>n</i> = 110)	44 (40)	66 (60.0)
Posttest2 (<i>n</i> = 125)	44 (35.2)	81 (64.8)

Note: Statements were adapted with permission from Buller, Reynolds et al. (2006) and Geller, Rutsch, Kenausis, & Zhang (2003).

Figure 4.3

Histogram Comparison Showing the Distribution of Attitude Scores Between Pre-test, Post-test 1, and Post-test 2.

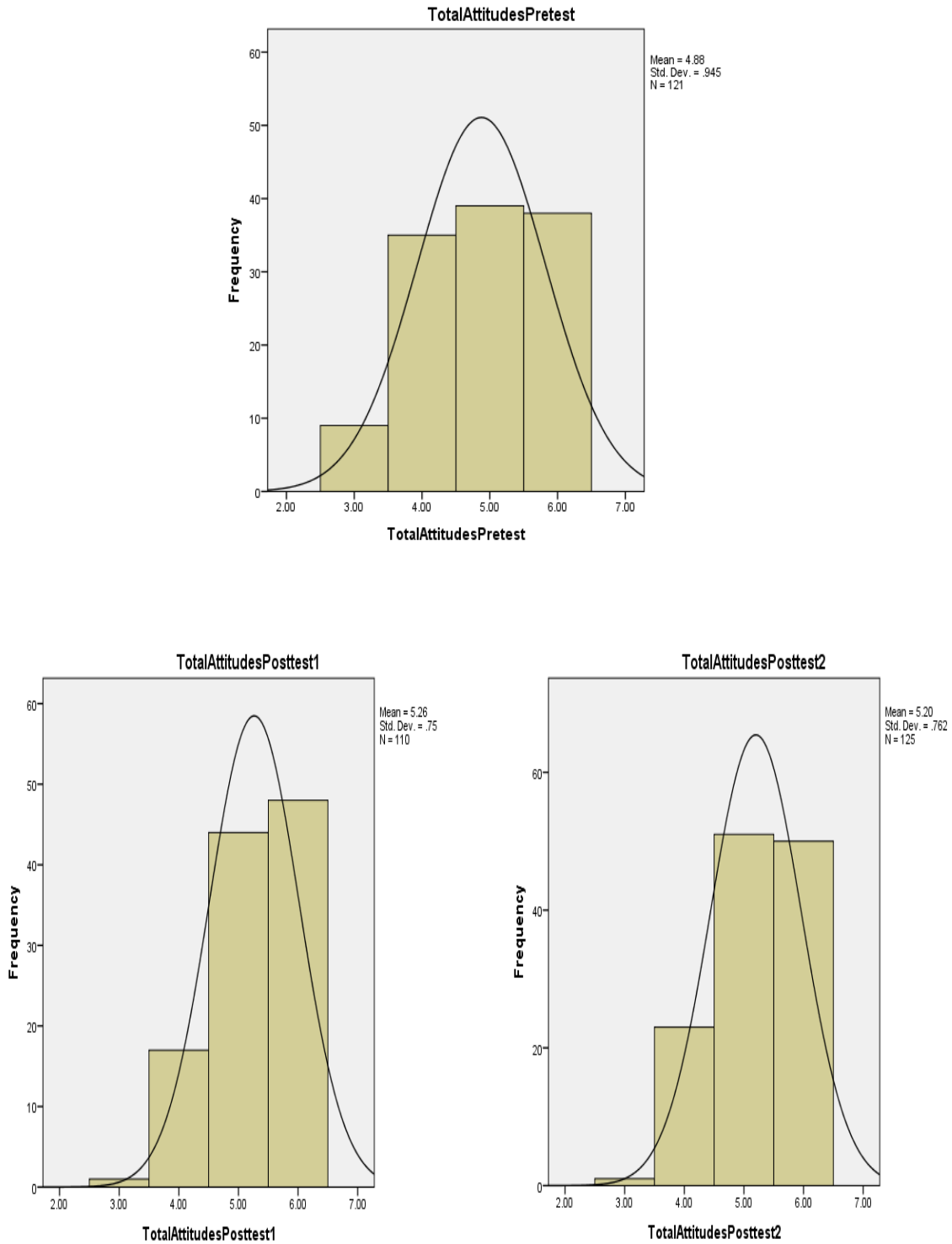


Figure 4.4

Histogram Comparison Showing the Distribution of Behavior Scores Between Pre-test, Post-test 1, and Post-test2.

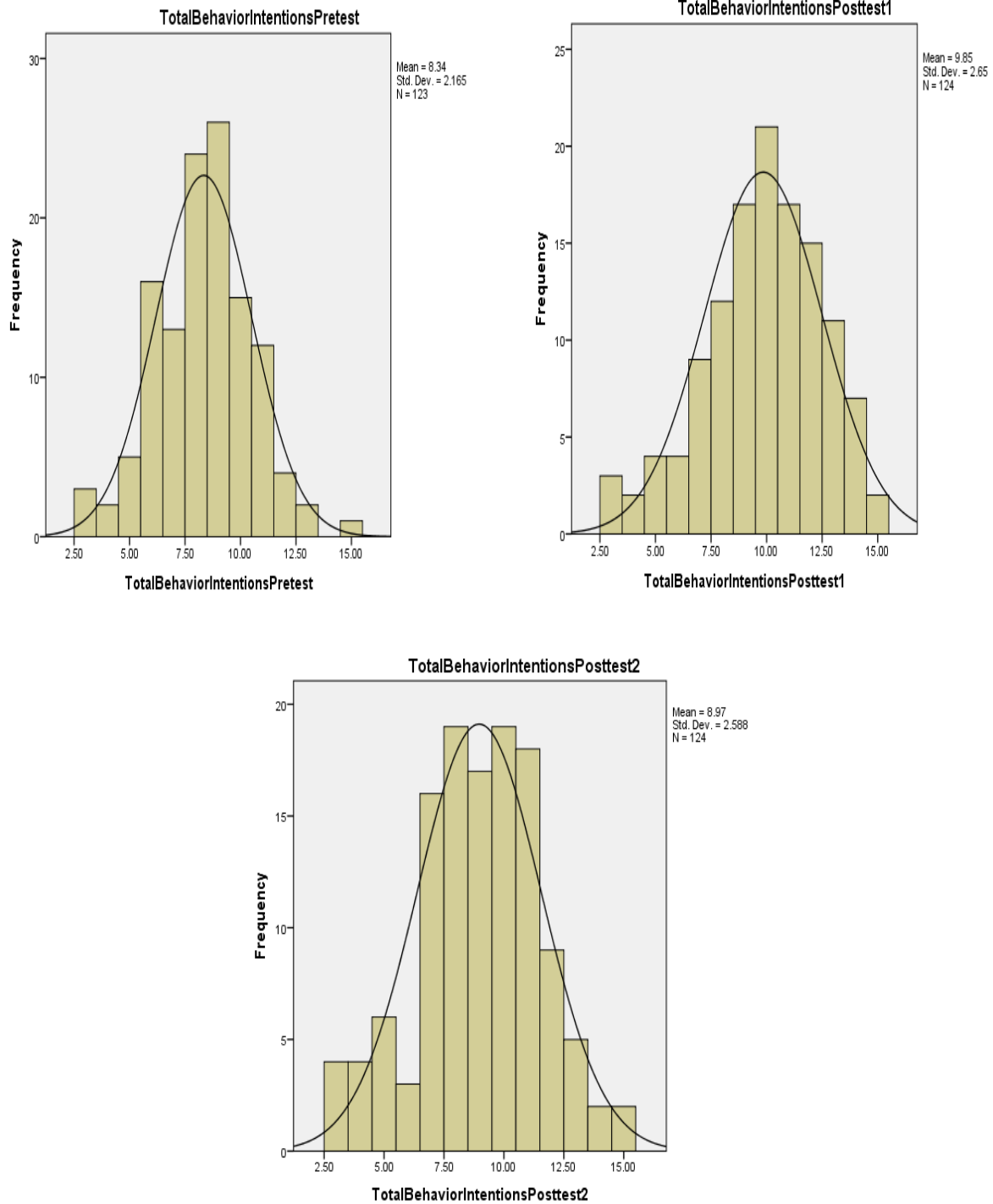


Table 4.7

Frequencies for Select Sample Characteristics on Total Attitudes Scores.

Reported in *M (SD)*. (Minimum score 3; maximum score 6)

	Pretest	Post-test 1	Post-test 2	Pretest-Posttest2 Significance (<i>p</i> value)
Gender				
Female	4.73 (.94)	5.16 (.75)	5.11 (.83)	<i>p</i> < .001
Male	5.03 (.94)	5.40 (.74)	5.30 (.68)	<i>p</i> < .05
Grade				
7	5.00 (.90)	5.34 (.77)	5.33 (.66)	<i>p</i> < .01
8	4.73 (.98)	5.17 (.72)	5.05 (.84)	<i>p</i> < .01
Age				
12	5.15 (.83)	5.41 (.79)	5.32 (.66)	<i>p</i> > .05
13	4.74 (.90)	5.27 (.68)	5.24 (.76)	<i>p</i> < .001
14	4.63 (1.13)	4.89 (.76)	4.88 (.85)	<i>p</i> > .05
Reported Sunburns				
None	4.93 (1.09)	5.30 (.70)	5.29 (.81)	<i>p</i> > .05
One or two	4.82 (.87)	5.23 (.80)	5.14 (.78)	<i>p</i> < .001
Three or more	5.06 (1.03)	5.36 (.61)	5.33 (.59)	<i>p</i> > .05

Table 4.8

Frequencies for Select Sample Characteristics on Total Behavior Scores.

Reported in *M (SD)*. (Minimum score 0; maximum score 15)

	Pretest	Post-test 1	Post-test 2	Pretest-Posttest2 Significance (<i>p</i> value)
Gender				
Female	8.39 (1.95)	9.88 (2.43)	8.90 (2.52)	<i>p</i> < .001
Male	8.28 (2.40)	9.81 (2.90)	9.03 (2.68)	<i>p</i> < .001
Grade				
7	8.86 (2.14)	10.21 (2.64)	9.51 (2.57)	<i>p</i> < .001
8	7.74 (2.05)	9.43 (2.62)	8.37 (2.50)	<i>p</i> < .001
Age				
12	9.19 (2.02)	10.64 (2.36)	9.76 (2.34)	<i>p</i> < .001
13	8.01 (2.16)	9.50 (2.75)	8.75 (2.77)	<i>p</i> < .001
14	7.35 (1.90)	9.04 (2.65)	7.88 (2.21)	<i>p</i> < .01
Reported Sunburns				
None	8.00 (2.48)	8.78 (2.41)	8.67 (2.35)	<i>p</i> > .05
One or two	8.44 (2.02)	10.24 (2.52)	8.94 (2.6)	<i>p</i> < .001
Three or more	8.44 (2.31)	9.72 (3.20)	9.56 (2.89)	<i>p</i> < .05

Table 4.9

Comparison of Participants' Behavioral Intentions Before and After the Intervention According to the Question.

Reported in Frequency (%)

	No	Probably Not	Most Likely	Yes
When you go outside in the sun next summer:				
Q1. Will you put sunscreen on when you go outside?				
Pretest (<i>n</i> = 124)	13 (10.5)	50 (40.3)	48 (38.7)	13 (10.5)
Posttest1 (<i>n</i> = 124)	6 (4.8)	28 (22.6)	48 (38.7)	42 (33.9)
Posttest2 (<i>n</i> = 124)	8 (6.5)	45 (36.3)	47 (37.9)	24 (19.4)
Q2. Will you stay out of the sun between the hours of 10:00 a.m. and 4:00 p.m.?				
Pretest (<i>n</i> = 124)	31 (25.0)	56 (45.2)	24 (19.4)	13 (10.5)
Posttest1 (<i>n</i> = 124)	21 (16.9)	53 (42.7)	41 (33.1)	9 (7.3)
Posttest2 (<i>n</i> = 124)	29 (23.4)	59 (47.6)	22 (17.7)	14 (11.3)
Q3. Will you wear protective clothing (like a hat or long sleeved shirt)?				
Pretest (<i>n</i> = 123)	34 (27.6)	59 (48.0)	24 (19.5)	6 (4.9)
Posttest1 (<i>n</i> = 124)	14 (11.3)	57 (46.0)	34 (27.4)	19 (15.3)
Posttest2 (<i>n</i> = 124)	21 (16.9)	61 (49.2)	27 (21.8)	15 (12.1)
Q4. Will you wear sunglasses?				
Pretest (<i>n</i> = 124)	11 (8.9)	23 (18.5)	51 (41.1)	39 (31.5)
Posttest1 (<i>n</i> = 124)	5 (4.0)	19 (15.3)	40 (32.3)	60 (48.4)
Posttest2 (<i>n</i> = 124)	7 (5.6)	25 (20.2)	41 (33.1)	51 (41.1)
Q5. Will you avoid tanning beds?				
Pretest (<i>n</i> = 124)	2 (1.6)	7 (5.6)	14 (11.3)	101 (81.5)
Posttest1 (<i>n</i> = 124)	3 (2.4)	1 (.8)	13 (10.5)	107 (86.3)
Posttest2 (<i>n</i> = 124)	1 (.8)	9 (7.3)	15 (12.1)	99 (79.8)

Note: Statements were adapted with permission from Buller, Reynolds et al. (2006) and Geller, Rutsch, Kenausis, & Zhang (2003).

CHAPTER 5

DISCUSSION

The results of this EBP project provide direction for enhancing sun safety education in middle school settings using an innovative program that can be easily integrated into existing curricular maps. The EBP project was designed to answer the PICO question: For middle school children, does the use of a multifaceted sun safety program positively impact knowledge, attitudes, and/or intentions to practice sun protective behaviors, as compared to the knowledge level, attitudes, and sun protective behaviors within these children prior to the sun safety program? Although significant positive shifts in knowledge, attitudes, and behavioral intentions occurred as a result of project implementation, a careful examination of key factors playing a role in successful implementation is warranted. In this chapter, the Promoting Action on Research Implementation in Health Services (PARIHS) framework will be used to guide a thorough evaluation of the project.

Explanation of Findings

To introduce a successful change within the practice, the implementation of the intervention must be guided by the evidence, the quality of context, and the type of facilitation; these are the key concepts of the PARIHS framework (Rycroft-Malone, 2004). Each concept will be detailed within the discussion of this EBP project.

Evidence.

A decade of research focusing on school-based interventions to increase sun-protective behaviors in adolescents yielded high quality evidence to support this EBP project. The DNP student developing this project had access to databases providing evidence in the form of systematic reviews (Saraiya et al., 2004), literature reviews (Hart & DeMarco, 2008; Townsend et al., 2011), clinical practice guidelines (Glanz, Saraiya, & Wechsler, 2002; WHO, 2003), expert opinions (SCF, 2012; USPSTF, 2012) and primary research (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Irwin et al., 2007; Kamell et al., 2011; Kristjansson et

al., 2003; Olson et al., 2008; Olson et al., 2007; White et al., 2010). The retrieved literature reviewed for this project focused on the effectiveness of specific school-based interventions for adolescents to promote healthy sun safe behaviors. Using the ACE Star Model of EBP, the project coordinator critically appraised and summarized the available literature to guide the change in practice. The literature revealed comparable findings and recommendations which demonstrated the effectiveness of school-based interventions to promote sun-protective behaviors for this population.

Although research supported the development of the EBP project, the clinical experience of the site facilitators provided additional knowledge and perspective on how to successfully implement sun-protective education within the classroom. The designed project length and individual class activities were supported by the successes of previous research studies, but also the expertise and guidance of the middle school staff. Given the administrators and teachers involvement with this population and recognition that current sun safety education was lacking, the facilitators established that the EBP project was directly in line with the needs of the middle school. Evidence was made explicit to the principal, nurse, and middle school science teachers who critically reflected and decided that the educational content of the program was beneficial to all students and would be adapted into the standard curriculum for seventh and eighth grade science. Consensus on the importance of sun safety education and skin cancer prevention for this population was achieved between multiple stakeholders who were integral to this project's success.

Context.

In the PARIHS framework, the term context has been used to refer to the environment or setting in which the proposed change is to be implemented (Rycroft-Malone, 2004). Furthermore, the contextual factors that have promoted the successful implementation of evidence into practice are the broad themes of culture, leadership, and evaluation (Rycroft-

Malone, 2004). The context of this project was a small, local middle school's seventh and eighth grade science classrooms.

Within this EBP project, economic, social, and political factors impacted the organizational culture from project conception. The project coordinator gained access to this school system through professional connections with those in school administrator roles at neighboring facilities. Furthermore, acquaintances with the school nurse and science teachers from the personal perspective of a previous student at this facility also assisted with entry into the middle school classrooms. The nurse and teachers provided a social culture of eagerness and excitement to help a previous student excel academically. Had these relationships not existed, however, access to such a large population of students may have been met with challenges. Although the project coordinator was provided with support from the school principal, not all science teachers within the school were open to the proposed change in practice. The sixth grade science teacher, in particular, was resistant to outside material introduced in the classroom. This resistance was related to past experiences with guest speakers who failed to address state educational standards within their lectures. While the curriculum for this program aligned with state health and science educational standards, which were evident in the course outline, the sixth grade teacher ultimately declined the application of this program in her classroom.

The school principal's role as a transformational leader was imperative to gaining access to the entire middle school population. Additionally, while the principal was open and accepting of the application of this EBP project at her facility, it was evident by her appearance that she favored exposure to the sun and the look of tanned skin. At one point during project implementation the principal stepped into the classroom during the discussion of skin cancer and tanning, quietly stated "ignorance is bliss" to the teacher present, and then exited the room moments later. The sun protective behaviors and attitudes modeled by this principal may have played a role in the outcomes of the student responses within the project. Unfortunately, the

extent to which the principal's statement or tanning behaviors influenced the students was not measurable.

The seventh and eighth grade science teachers, in contrast, provided a culture supportive of sun safety and skin cancer prevention with the sharing of stories and experiences of their own related to the topic with students. Despite the schedule adaptations necessary by the science teachers for the project coordinator to utilize two 50-minute class sessions, they never portrayed any negativity about the program or the DNP students' presence. Instead, teachers embraced the subject matter and reported that they would be incorporating the topic of UV radiation into the following week's lectures upon completion of the final program evaluation. Again, the degree in which these positive role models impacted student responses on survey questionnaires was also immeasurable.

Facilitation.

In the context of the PARIHS framework, facilitation refers to the process of enabling the implementation of evidence into practice (Rycroft-Malone, 2004). The project coordinator served many roles enabling facilitation during the development and implementation of this EBP project, particularly those of facilitator and leader. Facilitation was guided by the ACE Star Model of EBP with the following five stages of knowledge transformation: (a) knowledge discovery, (b) evidence summary, (c) translation into practice recommendations, (d) implementation into practice, and (e) evaluation (Stevens, 2004).

As a facilitator, the project coordinator developed the Healthy Skin is IN curriculum based on a rigorous review and critical appraisal of the current best available evidence and delivered this material to students in an interactive manner. Drawing on the facilitator's subject knowledge and experience in pediatrics and skin cancer treatment, the DNP student pursued the role of educator in the delivery of program material. This decision was consistent with the evidence that programs were commonly successfully directed by those in healthcare positions ideal for role-modeling (Kamell et al., 2011; Kristjansson et al., 2003; Olson et al., 2007; Olson

et al., 2008; White et al., 2010). As a leader, the project coordinator encouraged input and feedback from the team consisting of a myriad of teachers, the principal, and the school nurse. The teachers' feedback on the project coordinator's presentation style was viewed as constructive, positively acknowledged, and taken into consideration to improve upon during each class session. Roles of the teachers during program implementation were clear prior to project initiation; a signed form detailed their responsibilities and their supervision was crucial during class activities. A limitation to the project design was the lack of formal evaluation or follow-up with teachers and administrators in regards to project implementation and outcomes. Further methods of obtaining feedback on the program implementation through the eyes of the teachers would be of value for future projects. Such information could provide insight into strengths and limitations of the project from the teacher's perspective. An evaluation conducted by administrators and teachers would also provide opportunity to discuss the potential for policy and environmental change. Teachers, nurses, and administrators in middle school settings can act as change agents to ensure enhanced sun-protective learning experiences for students.

Evaluation of the Applicability of the Theoretical Framework

The HBM, with the underlying concept that health behavior is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence, served as an appropriate guide to project selection (Hochbaum, 1958). Project efforts increased students' knowledge (*perceived susceptibility* and *perceived severity*), attitudes (*perceived benefits*), and behaviors (*perceived barriers*) to motivate change (*cues to action* and *self-efficacy*) toward a healthier future. The model was appropriate for evaluating the pre-test and post-test questionnaires in their relation to the constructs of knowledge, attitudes, and behaviors for the adolescent population. However, a limitation to the model which was considered prior to implementation was the extent of perceived susceptibility or unnecessary worry, in regards to the risk for developing skin cancer as an adolescent. Although the idea of unnecessary worry or excessive fear of developing skin cancer was considered prior to implementation, parent phone

calls to the project coordinator with concerns about similar issues were received. Parents were comforted in knowing that the program was not intended to scare the students, but rather educate them about the realities of skin damage and tanning at an early age and the effects moving forward into adulthood. In-class activities with UV sensitive devices encouraged cues to action and peer motivation to change behaviors. Another limitation to using the HBM model for this project was that barriers to action were not well measured within the questionnaire surveys utilized. Variables directly relating to barriers to action, such as a student not wanting to wear sunscreen due to the messiness of application or smell of the product, were not measured. Evaluating and addressing barriers to action would be beneficial to future projects. Yet, overall, the feasibility between the models' key constructs and the outcome measures in this project made the HBM an ideal framework for implementation.

Using the ACE Star Model of EBP, the project facilitator was guided through the five stages of knowledge transformation and able to successfully evaluate the change process within the middle school setting. All stages described within the ACE Star Model of EBP were relevant to the development, implementation, and evaluation of this EBP project. While the ACE Star Model typically describes changes in practice within a healthcare environment, the model also provided a good fit within the educational setting utilized for this project. The APN integrating this project developed education that was timely, cost effective, and meaningful for all participants including students, teachers, and administrators. Funding and materials were sought from relevant organizations concerning sun safety for adolescents, and scholarships were awarded from local professional nursing organizations. While the ACE Star Model provided an ideal framework to guide project design, the lack of ongoing evaluation and monitoring for needed adaptations was noted as a limitation to using the model within this project. For example, the optional poster competition had zero participants by the designated deadline, and therefore an extension was granted. In future projects, the description of the

poster competition as “optional” would be eliminated and methods of developing more rewarding incentives such as bonus points for participation would be considered. If this project is undertaken by the teachers in the future, a grade could be assigned to the poster, rather than ‘bonus points’; bonus points is still associated with an ‘optional’ activity. Ultimately the competition yielded two posters which were determined by the team of teachers to be an inadequate number for public display. An ongoing stage added to the ACE Star Model of EBP to assist in project adaptations by the coordinator would be useful.

Strengths and Limitations of the EBP Project

Despite success of this EBP project and an 88% response rate from those with consent status, the lack of completion of all three questionnaires by all participants was noted. Furthermore, the use of self-report as the primary method of data collection was a limitation. Reliance on adolescent self-report is subject to memory errors and social desirability tendencies (Buller, Reynolds, et al., 2006; Geller, Rutsch, Kenausis, & Zhang, 2003; Kristjansson et al., 2003). To control for this limitation, students were encouraged to complete the questionnaires themselves and not to rely on other students for answers.

While, 169 students were eligible to participate in the completion of questionnaires, only 142 had consent/assent to participate by the designated timeframe. The project coordinator was informed that teachers went to the extreme of having students call their parents to bring consent forms if they had forgotten to return them to school on the designated deadline day. While these efforts tremendously symbolize the strong support for this project within this school setting, questions remain as to why parents would not allow their child to participate in the activities of the program. Although this information cannot be tracked, a number of factors were considered. Perhaps students simply forgot their forms at home and were unable to reach a parent to bring the form to school by the deadline or the forms might have gotten lost or accidentally disposed of. Parents may have had concerns about confidentiality and the dissemination of data or fears about their child utilizing the skin viewing device. Parents also seemed to have some concern

about the possible risk of causing undue stress about skin cancer in a population that is not at high risk at this given point in their lives.

Of the 142 students who had consent/assent to participate, only 125 completed all three questionnaire forms. Those not completing all three forms were found to be absent from class on the day of administration or failed to return a completed form. Rationale considered for incomplete forms were concerns about the wording of certain questions which might have confused students or the formatting/alignment of questions that were easily missed when reviewing the developed tool. Unfortunately, two students were witnessed by the project coordinator when completing the post-test 1, simply drawing a straight line down a single column of answers on the survey. For instance, selecting "I don't know" on an entire page of the survey, demonstrating a lack of valuing the importance of this activity. Others were witnessed by the project coordinator on post-test 2 going through the questionnaires marking answers without reading them. Due to this observation, one has to be concerned about the reliability of the data and threats to the tool's internal validity through testing. Adolescents take many tests during the school day, and it would be reasonable to suspect that they might have been saving their concentration for tests which might have had a more direct impact on their academic standing (Irwin et al., 2007). Although these limitations impacted the number of participants and validity of the survey form, a large number of respondents still provided significant outcomes demonstrating the project's effectiveness.

Another limitation of this project was the timing allotted for the implementation of the sun-safety program. First, the DNP program driving the timeframe for this EBP project required implementation during the fall semester between the months of September to December. Complicating the application of this sun-safety program, these months in the Midwest climate of Northwest Indiana tend to limit the amount of warm weather and UV radiation intensity. Therefore, education related to UV radiation and sun-safety during a period when adolescents generally spend less time outdoors in the sun was not optimal. Ideally, the education would

have best been applied during the spring months so that the behaviors learned could have been easily applied and reinforced during the warmer summer season approaching. Given this timeframe for implementation by the DNP program, the project coordinator selected September as the best month to have a chance for students to still be exposed to the sun and apply the behaviors learned. Additionally, the UV detecting activities were also more successful during this month when the sun was still dominant.

Furthermore, due to the limited timeframe for evaluation of this EBP project, there was a lack of long-term follow up to evaluate whether outcomes were maintained over time. This lack of long-term follow up is consistent throughout the literature, where most researchers administered surveys immediately before (i.e., 5 to 10 minutes, 1 day, or 1 week) and shortly following (i.e., 5 to 10 minutes, 1 week, 2 weeks, or 3 months) the sun-protective intervention (Buller, Reynolds, et al., 2006; Irwin et al., 2007; Kamell et al., 2011; Kristjansson et al., 2003; Olson et al., 2008; White et al., 2010). This project supported that knowledge, behaviors, and attitudes can be improved and maintained over a one month period of time following interventions among the adolescent population. This data does not provide sufficient evidence to demonstrate the effectiveness of the intervention into high school years. Further research should then focus on longitudinal studies following such multifaceted interventions applied during adolescence over time.

Implications for the Future

Education and practice.

The findings of this project repeatedly speak to the potential role of the school nurse in the creation and provision of sun protective education for students, families, and the community. Research supports the implementation of sun safety education as early as primary school (Geller, Rutsch, Kenausis, & Zhang, 2003) and continuing into middle (Buller, Reynolds, et al., 2006; Kristjansson et al., 2003; Olson et al., 2007; Olson et al., 2008) and secondary school years (Irwin et al., 2007; Kamell et al., 2011; White et al., 2010). Nurses and APNs within the

community and school context are in ideal positions to improve the delivery of sun safety education across childhood and adolescence. In addition to incorporating school programs addressing sun protection, school nurses can participate in developing sun protection policies including the improvement of available shade on the playground, providing sunscreen reminder notes to parents before outdoor school field trips, and increasing the availability of sunscreen in the nurse's office (Geller, Rutsch, Kenausis, & Zhang, 2003). Nurses outside of school settings should also be aware of the importance of sun-protective health promotion education which can be incorporated during wellness visits. The USPSTF (2012) has recommended counseling children, adolescents, and young adults aged 10 to 24 years about minimizing their exposure to UV radiation to reduce the risk for skin cancer. Effective materials delivered in healthcare and community settings in adjunct to sun-protective education within schools is of importance for sun-safety efforts (Buller, Reynolds, et al., 2006). Resources such as toolkits and manuals to support effective programs are becoming increasingly available to nurses seeking to develop such interventions. Establishing the health risks of UV radiation and sun safety education as priority within schools with already packed curriculums will be crucial to future successes of those in positions to make a difference.

Theory.

The outcomes of this EBP project support the HBM and future theory development specific to adolescents and health promotion. The underlying concept of the HBM is that health behavior is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence (Hochbaum, 1958). Middle school is a period when adolescents are beginning to take responsibility for their health and establish their own lifetime health habits. Beliefs and perceptions about UV radiation exposure, skin cancer, and sun-protection play a major role in the future attitudes and behaviors important to minimize the incidence of skin cancer. Theory based interventions provide a valuable background vital to formulating effective sun-safety program designs. The TPB was another belief-based theory that

was found to correlate well with a middle school sun-safety program developed by White et al. (2010). White et al. (2010) provided preliminary evidence for the role of motivators (e.g. fashionable sun-safe products) and normative factors (e.g. the approval of friends and teachers) in encouraging sun safety among adolescents. The consideration and application of such constructs in future program design may lead to wider acceptance of skin cancer prevention and educational programs. Future theory formed interventions can provide supportive strategies in which to approach behavioral change among adolescents.

Research.

The Healthy Skin is IN project applied the best available interventions supporting an adolescent sun-protective middle school program. Previous researchers utilized not only educational interventions for students, but also those directly impacting school policy, professional development, family support, community awareness, and healthcare providers. Glanz and Saraiya et al. (2002) reported that schools should determine which recommendations have the highest priority based on the (a) needs of the school and (b) available resources. While the literature supported numerous interventions for a variety of audiences and settings, this EBP project explored only the educational intervention component of supporting evidence due to the limited resources available. As more resources become available, schools could implement additional recommendations to support a coordinated approach to preventing skin cancer (Glanz, Saraiya et al., 2002). More intensive reviews, incorporating sun-protective education and school policy strategies within a community framework, would be of value to school systems interested in a comprehensive approach to translating knowledge into practice. Olson et al. (2007) reported that direct interventions and evaluations of parents and role models (i.e., teachers, coaches, and family members) would also be important to consider in the future.

Evaluating educational efforts among differing age groups of children, including preschool and high school, could be equally important to minimizing the future incidence of skin

cancer. Based on the outcomes of this EBP project and similar programs published in the literature, future research should aim to provide consistent cross-curricular methods of educational interventions to all ages of students repeatedly over time. Longitudinal measures evaluating the effectiveness of primary interventions into high school years and adulthood would have tremendous impact for this area of nursing research. Whether the favorable effects of successful school-based strategies would be enhanced through repeated instruction beyond a year is uncertain (Buller, Reynolds, et al., 2006). Longer lasting follow up studies are needed to demonstrate whether knowledge and behavioral change is persistent across time.

Conclusion

Overall, the project has provided substantial evidence supporting the use of a multifaceted school-based sun protective educational program to improve the knowledge, attitudes, and behaviors of adolescents. Key outcome measures of the initial PICOT question were answered; however, the long term impact of skin cancer incidence for this population remains uncertain. School based interventions have the potential to minimize the future risk of developing skin cancer and other UV related disorders, but measuring for this risk was not addressed within this project design. When developing this program, the change began as a vision for improving the sun safe behaviors of adolescents, continued as the project coordinator examined a wealth of information, and ultimately manifested in project completion. The ACE Star Model of EBP was an appropriate guide to project selection, but did not provide the direction needed to make adaptations as necessary through the implementation process. The HBM was also an ideal fit for this EBP project, providing the necessary constructs to overcome adolescent perceptions about skin cancer and tanning. Project site facilitators provided an inviting culture and joined in a collaborative effort to become transformational leaders in the middle school setting. The small nature of the local public middle school in Northwest Indiana, serving as the implementation site for this project, may limit the project's applicability to private/charter organizations and students attending larger school corporations. But, there are

now 125 adolescents who are potentially at decreased risk for developing skin cancer due to positive shifts in knowledge, attitudes, and behaviors following the implementation of this school-based program. Initiation of this EBP project provided administrators with policy change recommendations, families with enhanced knowledge and skin cancer resources, educators with sun-safety curriculums and materials, and students with enriched educational experiences that can remarkably shape their future.

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BIOGRAPHICAL MATERIAL

Ms. Munden graduated from Purdue University North Central with an Associate Degree in the Science of Nursing (ASN) in 2005 and Baccalaureate in the Science of Nursing (BSN) in 2006. Her early nursing career included experiences on medical, surgical, cardiac, and pediatric units at St. Anthony Medical Center. Ms. Munden completed her Master's in the Science of Nursing (MSN) with Adult Clinical Nurse Specialist focus from Valparaiso University in 2008 and the Post Master's Family Nurse Practitioner program in 2009. Upon graduating, Ms. Munden was awarded the *Valparaiso University Alumni Association Distinguished Award for Graduate Studies and Continuing Education* and the *Graduate Faculty Academic Excellence Award*. During her graduate studies, Ms. Munden served as a research assistant for *Health Visions Midwest* and the *CDC Racial and Ethnic Approaches to Community Health U.S. Grant*. Ms. Munden's participation in this research awarded her the privilege of being the guest speaker at the Sigma Theta Tau International Zeta Epsilon induction ceremony in 2009. Ms. Munden is certified by the American Nurses Credentialing Center (ANCC) as a Family Nurse Practitioner and has served on the board of the Northwest Indiana Society of Nurses in Advanced Practice (SNAP) for three years. Ms. Munden's initial role as a nurse practitioner was with a local plastic surgeon specializing in the areas of plastic and reconstructive surgery, skin cancer, work-related injuries, and aesthetic medicine. Within this environment, Ms. Munden had first-hand experience with the long-term, potentially deadly, consequences of previous sun exposure. Impassioned by this experience, Ms. Munden developed her Doctorate of Nursing Practice (DNP) project *Healthy Skin is IN*, which incorporates her pediatric nursing experience and passion for health promotion. Ms. Munden is currently practicing as a family nurse practitioner in a retail healthcare setting and continues to volunteer in skin cancer screenings at local community events. Ms. Munden was awarded the Coalition of Advanced Practice Nurses of Indiana (CAPNI) scholarship for her doctorate work and was selected to present her findings at the Midwest Nursing Research Consortium (MNRS) in March of 2013.

ACRONYM LIST

AAP: American Academy of Pediatrics

ACE: Academic Center for Evidence-Based Nursing

ACS: American Cancer Society

AHRQ: Agency for Healthcare Research and Quality

APNs: advanced practice nurses

ASA: American Skin Association

BSA: body surface area

CCC: Comprehensive Cancer Control

CDC: Centers for Disease Control and Prevention

CE: European Conformity

DNP: Doctorate of Nursing Practice

EBP: evidence-based practice

EPA: Environmental Protection Agency

FDA: U.S. Food and Drug Administration

HBM: Health Belief Model

HCHPP: Healthy Communities Healthy People Program

ICC: Indiana Cancer Consortium

IRB: Institutional Review Board

MeSH: medical subject heading terms

NCCCP: National Comprehensive Cancer Control Program

NCI: National Cancer Institute

PICO: patient population, intervention of interest, comparison intervention or status, and
outcome (study design)

RAYS: Raising Awareness in Youth about Sun Safety

RCTs: randomized controlled trials

RoHS: Restriction of Hazardous Substances

SkinSAT: skin sun-acne tutorial

SCF: Skin Cancer Foundation

SDHW: Sunny Days Healthy Ways

SPF: sun protection factor

TPB: theory of planned behavior

UCI: University of California-Irvine

USDHHS: U.S. Department of Health and Human Services

US: United States

USPSTF: U.S. Preventive Services Task Force

UV: ultraviolet

WHO: World Health Organization

WWW: World Wide Web

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Buller et al. (2006) <i>American Journal of Preventive Medicine</i></p> <p>Effects of Sunny Days, Healthy Ways curriculum on students in grades 6 to 8</p> <p><i>Level II</i> Good quality</p>	<p>RCT</p> <p>Pair-matched, group randomized pre- and post-test, controlled trial</p>	<p>2,038 children from middle schools (grades 6-8) in Colorado, New Mexico, and Arizona</p>	<p>Examined whether exposure to the Sunny Days Healthy Ways (SDHW) sun-safety educational program would increase children's sun-protection behavior</p> <p>SDHW curriculum consisted of six 50 minute teacher directed lessons, teaching key prevention skills</p>	<p>Children receiving SDHW curriculum reported more frequent sun protection ($p = .0035$) and a greater proportion wore long sleeved shirts during recess ($p < .0001$)</p> <p>Exposure to curriculum improved knowledge ($p < .0001$), decreased perceived barriers to using sunscreen ($p = .0046$), enhanced self-efficacy expectations about sun safety ($p = .0577$), and reduced favorable attitudes toward sun tanning ($p = .0026$ to $p < .0001$)</p>	<p>Did not provide evidence on whether SDHW would remain effective into high school years</p> <p>May be unreasonable to expect that school programs alone will produce large improvements in sun protection</p>	<p>SDHW improved knowledge and created positive attitudes toward sun protection, and increased self-reported sun safety by children</p> <p>Programs should be coupled with other community-wide efforts</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Geller et al. (2003) <i>The Journal of School Nursing</i></p> <p>Evaluation of the SunWise school program</p> <p>Level II Good quality</p>	<p>RCT</p> <p>Pre and post-tests in schools receiving SunWise</p> <p>Testing in schools receiving SunWise (experimental) and not receiving SunWise (controls)</p> <p>Surveys conducted by school nurses in two separate academic years</p>	<p>85 primary and secondary schools (Grades K-8) located in U.S. cities, suburbs, and rural areas of 35 geographically representative states</p> <p>Majority of schools were public schools</p> <p>7 schools were private or charter</p>	<p>Examined the effectiveness of the SunWise school program on increasing children's knowledge, attitudes, and practices</p> <p>SunWise consisted of 1-2 hours of cross curricular, standard based classroom lessons that focus on the effects of UV radiation, risk factors for overexposure, and sun protection habits</p>	<p>Changes in knowledge, attitudes, and intentions were more likely in experimental schools than control schools</p> <p>Identifying that wearing a hat and shirt outside were ways to keep the skin safe from the sun increased from 60% to 75% ($p < .001$)</p> <p>Awareness that SPF 15 was minimal number needed for sun protection improved from 50% to 78% ($p < .001$)</p> <p>Awareness of UV index improved overall from 28% to 57% ($p < .001$)</p> <p>At baseline, 27% of children reported they thought suntans were good for the skin compared to 20% at post-test ($p < .001$)</p> <p>Intentions to play in the shade increased from 70% to 76% ($p < .001$)</p>	<p>School nurses and teachers volunteering to participate may not have reflected the profile of school faculty</p> <p>Measuring real change in sun protection practices over such a short time span, particularly among children in cooler climates was difficult</p> <p>Self-reports of sun protective practices are susceptible to memory errors and social desirability tendencies</p>	<p>SunWise school program resulted in substantial increases in children's knowledge and modest changes in children's perception of healthiness of a tan and their intentions to play in the shade</p> <p>Teaching of new curriculum should be woven into existing school lessons and must be both effective and economical</p>

<i>A Review of the Evidence from the Appraisal of Literature</i>
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Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Glanz, Saraiya, & Wechsler (2002) <i>MMWR</i></p> <p>CDC guidelines for school programs to prevent skin cancer</p> <p><i>Level I</i></p>	Practice Guidelines	Schools- primary and secondary (children 5-18 years old)	<p>Help schools improve health of young persons by promoting behaviors to prevent leading causes of illness and death</p> <p>Recommendations for skin cancer prevention activities within a coordinated school health program</p>	<p>Broad guidelines include:</p> <ol style="list-style-type: none"> 1) Policy 2) Environmental Change 3) Education 4) Family Involvement 5) Professional Development 6) Health Services 7) Evaluation 	Guidelines are not specific for child care facilities or other organizations that provide opportunities for children and adolescents to spend time outdoors (camps, sports fields, playgrounds, swimming, and parks), but can be used as a guide in these alternative settings	A comprehensive school approach to skin cancer prevention includes policies, environmental change, educational curricula, family involvement, professional development, integration with health services, and evaluation.

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Hart & DeMarco (2008) <i>Journal of Pediatric Oncology Nursing</i></p> <p>Primary prevention of skin cancer in children and adolescents: A review of the literature</p> <p>Level V</p>	Literature review of descriptive studies	Children and adolescents	Evaluate the status of primary prevention interventions and identify gaps in national and international research in order to make suggestions for further intervention design	<p>Need for primary prevention of skin cancer in primary schools is a major public health issue</p> <p>Primary prevention interventions in primary schools target children between kindergarten and 8th grade</p> <p>Educational and behavioral initiatives aim to augment students' knowledge of sun-safe behaviors and attitudes toward skin protection and to encourage students to practice more sun-protective behaviors</p> <p>Primary prevention interventions at the primary school level have enjoyed success that other prevention programs have not shared</p>	<p>The largest research gap concerning skin cancer prevention is evaluation of the effectiveness of primary interventions</p> <p>Discontinuity in methods and measurement techniques</p> <p>Adjustment of attitudes and social norms toward more positive reception of skin protection behaviors needs more extensive investigation</p>	<p>Most effective interventions used multi-component curricula administered over an extended period of time</p> <p>Younger children were more receptive to interventions than were older children, who had stronger attitudes against sun-protective behaviors</p> <p>Interventions in Australia have been more successful than in North America and Europe</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Irwin et al. (2007) <i>American Academy of Dermatology</i></p> <p>Skin sun-acne tutorial evaluation among middle- and high-school students in central New Jersey</p> <p><i>Level VI</i> Fair quality</p>	<p>Descriptive study</p> <p>Pre- and post-test design</p>	1,214 middle and high school students in New Jersey	<p>Examined the effectiveness of the skin sun acne tutorial (SkinSAT) on student knowledge of sun protection and acne</p> <p>25 minute lesson comprised of PowerPoint slides, text, pictures, and live narration by a health educator</p> <p>Overview of the anatomy of skin, background on skin cancer and acne, and skin care tips</p> <p>Hands-on activities were woven into the lesson</p>	<p>All students, regardless of sex, ethnicity, age, or race, improved significantly from the pre-test to post-test scores ($p < .001$)</p> <p>Student knowledge scores on acne and sun protection increased by 36.6% ($p < .001$, 95% CI) from an average of 43.8% on pre-test to an average of 80% on the post-test</p>	<p>No control group</p> <p>Only one health educator was used in the study</p> <p>Only public schools in New Jersey were visited</p> <p>No long-term follow up to see whether the participants retained their knowledge</p> <p>Participants' knowledge may have been enhanced by taking the pre-test</p>	<p>SkinSAT was an effective tool for increasing knowledge about sun protection and acne</p> <p>SkinSAT was simple and effective</p> <p>This program has the potential to be implemented nationwide for teachers and volunteers to instruct adolescents about acne and sun protection</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Kamell et al. (2011) <i>Journal of Cancer Education</i></p> <p>Medical students educate teens about skin cancer: What have we learned?</p> <p><i>Level VI</i> Fair quality</p>	Descriptive study	1,260 students in grades 6-12 at five Orange County, CA public schools	<p>Examined the effectiveness of a program developed to teach students in grades 6-12 about the importance of sun protection and early detection of skin cancer</p> <p>Intervention consisted of a 50 minute interactive curriculum based on a review of the literature and other existing skin cancer educational programs</p>	<p>Significant, sustained improvement in knowledge and behavior scores from the first to third survey (both $p < .001$)</p> <p>On average, teens surveyed reported having shared what they learned from the educational session with 1.65 other individuals</p>	Researchers did not specifically evaluate changes in medical student volunteers' knowledge, attitudes, and behaviors	<p>Medical students can be an asset to health awareness public outreach</p> <p>Volunteers keep education cost-effective, result in the spread of information, reinforce knowledge and communication skills of future physicians, and can result in the early detection of melanoma</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Kristjansson et al. (2003) <i>Health Education Research</i></p> <p>'You and Your Skin': A short duration presentation of skin cancer prevention for teenagers</p> <p>Level II Good quality</p>	<p>Quasi-experimental</p> <p>Non-equivalent control group design was used with pre-testing and post-testing 3 months after the intervention</p>	<p>184 adolescents (ages 13-15) at the year 7 and 8 levels in Stockholm County, Sweden</p>	<p>Evaluated the effectiveness of a school-based intervention program using the skin cancer prevention kit 'You and Your Skin'</p> <p>Application of educational material with instructions and recommendations implemented by student's regular teacher or school nurse during one lesson (45minutes)</p> <p>Included a manual for teachers, overhead transparencies, video tape, and recommendations on how to behave in the sun</p>	<p>No statistical difference between the groups at baseline regarding the proportion of students that were able to progress in their stage of change</p> <p>Intervention group had a higher proportion of students who were able to progress in their readiness to give up sunbathing ($p = .01$)</p> <p>Students in the intervention group were more likely to have increased their knowledge than those in the control group (61% versus 39%, $p < .05$)</p>	<p>Use of regular teacher to implement the intervention and collection of data</p> <p>Researchers drew an equal number of control and intervention classes in each school instead of dividing schools into control and intervention</p> <p>Self-reporting data may be affected by social desirability and recall</p> <p>Limited control and attrition</p>	<p><i>You and Your Skin</i> can be used in skin cancer prevention to enhance knowledge of the risks of skin cancer, UVR exposure and sun protective behavior among adolescents in school settings</p> <p>More extensive interventions are probably needed to affect attitudes and the motivation to change behaviors</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Olson et al. (2008) <i>Health Education Research</i></p> <p>The impact of an appearance-based educational intervention on adolescent intention to use sunscreen</p> <p><i>Level VI</i> Good quality</p>	Descriptive study	49 seventh and eighth grade students in a rural Vermont middle school	<p>Explored the impact of an adolescent health and appearance focused educational intervention, including viewing of facial skin changes under UV light, on future intentions to use sunscreen</p> <p>Intervention included a 30 minute educational session with visual materials on the risks of sun exposure as well as practical strategies about how to improve sun protection</p> <p>Students viewed their face under filtered UV light</p>	<p>After the intervention, student sun benefit and sun risk attitudes changed significantly</p> <p>Less benefit was perceived on the sun benefit scale ($p = .001$) and more risks on sun risk scale ($p = .011$)</p> <p>One-third of students who had not previously intended to use sunscreen in the next month now indicated that they intended to use it</p> <p>Students who had seen skin damage were more likely to report intended use of sunscreen</p>	<p>Researchers asked about a specific outcome behavior involving use of sunscreen with SPF 15 when outside in the sun for > 15 minutes for the next 30 days</p> <p>Although multiple means of protection were emphasized and avoidance of tanning, these items were not assessed</p> <p>There was also no data to explore gender or skin type effects</p>	<p>A brief educational intervention that included viewing facial skin damage related to UV radiation exposure and peer response to skin damage can result in intent to change use of sunscreen and perhaps other sun protective behaviors</p> <p>Researchers recommend adolescent sun protection educational sessions that utilize peer and observed personalized risk assessment</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Olson et al. (2007) <i>Pediatrics</i></p> <p>SunSafe in the Middle School Years: A community-wide intervention to change early-adolescent sun protection</p> <p><i>Level II</i> Good quality</p>	<p>RCT</p> <p>Ten communities were matched into 5 pairs on the basis of school and community characteristics and then randomly assigned to intervention or control status</p> <p>Baseline observations of sun-protection behaviors for adolescents occurred in 2000, community wide intervention activities were conducted for 3 years, and follow-up observations occurred in 2001, 2002, and 2003</p>	<p>1,927 adolescents entering 6th to 8th grades in 10 community settings in New Hampshire and Vermont</p>	<p>Examined the change in mean percent BSA protected at community beaches, swimming pools, or school-sponsored water activities after 1 and 2 years of adolescent exposure to the intervention package</p> <p>Community intervention designed to deliver sun-protection messages through multiple channels in the school and community</p> <p>Utilized SunWise curricular materials, DermaScan, poster contests and weekly announcements by students</p>	<p>There was an 8% decrease from baseline in the intervention group adolescents versus a 23% decrease in control site adolescents</p> <p>Resulted in an average of 9.7% more BSA protected in the intervention teens compared to the control group after 2 years</p> <p>After 2 years, 36.1% of intervention subjects were well protected versus 12.8% of controls (p < .001)</p> <p>The average number of different sources of advice about sun protection steadily declined in the control communities but was maintained over time in the intervention communities</p>	<p>Unable to study longitudinal cohort of students</p> <p>Cancellations of school events because of weather during 2 years made it impossible to obtain a large enough sample of adolescents to determine sun protection at other outdoor activities</p>	<p>New approaches to delivering sun protection messages in early adolescence has an impact on sun-protection behaviors at community level</p> <p>Consistent messages across multiple venues involving teens, as well as adults are needed in early adolescence</p> <p>Skin cancer prevention programs need to begin early in middle school, when they are making independent choices</p> <p>A community environment needs to support sun protection rather than focusing on classroom health education alone</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Saraiya et al. (2004) <i>American Journal of Preventive Medicine</i></p> <p>Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation</p> <p><i>Level I</i></p>	Systematic Review	Primary schools	<p>Presents the results of 33 reports on the effectiveness of educational and policy interventions in primary schools from 1996 to 2000</p> <p>15 Interventions: classroom teaching (3 studies), didactic teaching using sunscreen samples (1 study), interactive class and home-based activities (4 studies), health fairs (1 study), educational picture book (1 study), teaching by medical students (1 study), interactive CD-ROM programs (2 studies), and peer education (2 studies)</p>	<p>22 of 25 intervention studies showed a significant increase in knowledge; 13 of 17 demonstrated a significant change in attitude; 4 reports evaluated intentions and their findings were inconsistent in direction and generally not statistically significant</p> <p>Sun protective behaviors included: 1) covering up, 2) using sunscreen, 3) avoiding the sun, and 4) composite behaviors</p> <p>For sun avoidance behaviors, the relative median change was 4% for those studies that had a comparison group and 16% for those studies that had a before-after design</p>	<p>One study showed little relationship between sun-protection policy and sun-protective behavior changes; One study evaluated the effect of an intervention on sunburns which led to a 43% reduction in sunburns</p> <p>Study design markedly affected the effect size in the data</p>	<p>Evidence is sufficient to determine the effectiveness of interventions in primary schools in improving the covering-up behavior; however evidence is insufficient to determine the effectiveness in improving other sun-protective behaviors</p> <p>Interventions improve knowledge and attitudes related to skin cancer prevention</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Skin Cancer Foundation. (2012) <i>Skincancer.org</i></p> <p>Prevention guidelines.</p> <p><i>Level VII</i></p>	Expert opinion	Primary schools, particularly grades 6-8	<p>Educate the public and medical profession about skin cancer, its prevention by means of sun protection, the need for early detection, and prompt effective treatment</p> <p>Support school sun-safety legislation and education across the country at every grade level</p> <p>Develop a lesson plan for 6-8 grade students aligning with the CDC National Health Education Standards</p>	<p>Guidelines for sun protection:</p> <ol style="list-style-type: none"> 1) seeking shade, 2) avoiding tanning and tanning booths, 3) covering up, 4) using a broad spectrum UVA/UVB sunscreen with SPF 15, 5) applying one ounce of sunscreen 30 minutes before going outdoors, 6) examining skin from head-to-toe every month, and 7) seeing a physician annually for a skin exam <p>Lesson plans should teach students about UV radiation from the sun and tanning beds, how it affects their skin, and why protecting themselves from both forms is critical to preventing skin cancer</p>	<p>Innovators of this program did not describe the methods used to develop their guideline recommendations or lesson plans in Rays Awareness program</p> <p>Educational program is currently only available for grades 6-8, limiting applicability to younger age groups</p>	<p>Children are more inclined to practice sun protection if they understand why it is important, namely to prevent skin cancer and premature aging</p> <p>Sun safety should be integrated into the curriculum at every grade level, and classroom instruction can be reinforced through posters, staff reminders, assemblies, and sun safety videos</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>Townsend et al. (2011) <i>Journal of the American Academy of Dermatology</i></p> <p>Targeting children through school-based education and policy strategies: Comprehensive cancer control activities in melanoma prevention</p> <p>Level V</p>	<p>Qualitative Case Study Review</p> <p>Case studies were conducted through semi-structured narrative summaries provided by the Comprehensive Cancer Control (CCC) director overseeing the sun-safety program.</p>	<p>New Mexico's Raising Awareness in Youth about Sun Safety Project (RAYS)</p> <p>Sun Protection in Florida Project K-8</p> <p>Arizona SunWise Program</p>	<p>Gain more in depth knowledge of how CCC programs and partnerships were implementing proven sun-safety programs</p> <p>Highlight barriers and facilitators to implementing interventions across multiple populations in three state programs</p>	<p>Although each state used similar educational models, including EPA's SunWise program, there were considerable differences in strategies for implementation</p> <p>RAYS demonstrated behavior change in a positive direction overall</p> <p>Florida's results from five counties showed an increase in sun-safety knowledge after the educational session</p> <p>Arizona implemented the program statewide; Evaluation showed marked outcome improvement, of student willingness and commitment to protect skin by using sun safety strategies</p>	<p>Barriers to implementation included difficulties reaching schools and school administrators and changes in staff workload.</p> <p>This report only highlights experiences of 3 sun-safety programs, but many more CCC programs and partnerships are implementing similar sun-safety programs</p> <p>Future studies should focus evaluation using RCT to test implementation strategies</p>	<p>Partnerships and program advocates are important for successfully implementing and sustaining sun-safety programs</p> <p>School policy and environmental change are important and valued components of sun-safety programs</p> <p>Facilitators included using innovative recruitment approaches, having community partners, and reaching out to educators in various settings</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
USPSTF (2012) <i>Annals of Internal Medicine</i> Behavioral counseling to prevent skin cancer: US Preventive Services Task Force recommendation statement <i>Level VII</i>	Expert opinion	Children, adolescents, and young adults aged 10 to 24 years who have fair skin	Targeted literature search for new evidence that counseling patients about sun protection reduces intermediate outcomes of skin cancer Addressed the link between counseling and behavior change, the link between behavior change and incidence of skin cancer, and the adverse effects of counseling or sun-protective behavior changes	Recommends counseling children, adolescents, and young adults aged 10 to 24 years who have fair skin about minimizing their exposure to UV radiation to reduce risk for skin cancer Successful counseling interventions used cancer prevention or appearance-focused messages to reach specific audiences Interventions include community-based communications and policy regulation to increase preventive behaviors among populations in specific settings, particularly primary schools and outdoor recreational areas	Further randomized, controlled trials are needed to develop effective interventions for children Does not consider the costs of providing a service in this recommendation Clinical decisions involve more considerations than evidence alone	For children, adolescents, and young adults aged 10 to 24 years, the USPSTF concluded with moderate certainty that the net benefits are moderate for counseling to decrease UV exposure and reduce the risk for skin cancer For adults, there was inadequate evidence on the efficacy of counseling to change behavior

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>White et al. (2010) <i>Preventive Medicine</i></p> <p>Testing a belief-based intervention encouraging sun-safety among adolescents in a high risk area</p> <p><i>Level II</i> Good quality</p>	<p>RCT</p> <p>Evaluated a theory of planned behavior (TPB) belief-based intervention</p>	<p>80 adolescents aged 13-16 years from two secondary schools (one government and one private) in Queensland, Australia from October 2007-June 2008</p>	<p>Evaluated the efficacy of a TPB beliefs, intentions, and sun-safety behavior</p> <p>The TPB intervention targeted previously identified costs and benefits, important referents, barriers, and motivators</p> <p>3-one hour sessions for 3 weeks conducted by Cancer Council Queensland employees with focus on sun protection, normative beliefs, and control</p>	<p>Students completing intervention reported stronger sun-safe normative, motivator beliefs, intentions, and performance of more sun-safe behaviors across time than those in control group</p> <p>Significant Time (pre-intervention vs. post-intervention) x Condition (intervention vs. control groups) effects:</p> <p>Normative beliefs-significance across time in intervention condition, $p = .082$, but not in control condition, $p = .233$</p> <p>Motivator beliefs-significant difference across time in intervention condition, $p = .012$, and in control condition, $p = .015$</p> <p>Intention- significant difference across time in intervention $p = .030$, but not in control condition $p = .395$</p> <p>Behavior- difference approaching significance across time in intervention condition, $p = .065$, but not control condition $p = .200$</p>	<p>No prior calculation for sample size was evident in the article</p> <p>Despite the strength of a theory-informed intervention, the small sample and self-reported measures were limitations</p>	<p>Strengthening beliefs about the approval of others and motivators for sun protection may encourage sun-safe cognitions and actions among adolescents</p>

A Review of the Evidence from the Appraisal of Literature

Author(s), Publication, Level of Evidence	Study Design	Population, Setting	Purpose, Intervention(s)	Results/Findings	Limitations	Conclusions, Recommendations
<p>World Health Organization (2003) <i>WHO</i></p> <p>Sun protection and schools: How to make a difference</p> <p><i>Level I</i></p>	<p>Practice Guidelines</p> <p>Developed through collaboration with EPA, WHO, national and local authorities, and non-governmental organizations active in health promotion and sun protection programs</p>	School systems and children	Provide recommendations on the necessary steps for establishing school-based programs on sun protection	<p>A school program on sun protection should adopt an integrated approach to help students, teachers, staff and the community to avoid health risks of UV radiation exposure</p> <p>Important elements to a school-based sun protection program include:</p> <ol style="list-style-type: none"> 1) sun protection education, 2) a healthy school environment, 3) a school endorsed sun protection policy, and 4) community and family involvement 	<p>Methods of evidence retrieval for development of recommendations are not identified</p> <p>Specific age groups for use of the guideline are not described</p> <p>Authors failed to describe how recommendations will be evaluated or updated</p>	<p>Key elements of effective sun protective interventions in schools include: comprehensive sun protection policy, strategies to promote sun protection through appropriate behavior, the school environment, curriculum activities, and a regular review process</p>

Appendix B

‘Healthy Skin Is In’: A Multifaceted Sun Safety Program for Adolescents**Subjects:** Health and Science**Topic:** Sun Safety**Grade Level:** 7 and 8**Teacher:** Lindsay Munden, FNP-BC**Goals:**

- 1) Increase knowledge of ultraviolet radiation.
- 2) Increase awareness of skin cancer.
- 3) Increase intentions to practice sun protective behaviors.

Objectives:

- 1) Students will be able to
 - a. Describe the harmful and beneficial effects from the sun;
 - b. Define UV radiation and the factors that affect its intensity;
 - c. Identify the basic anatomy of the skin;
 - d. Explain the health risks from overexposure to UV radiation;
 - e. Identify risk factors that affect an individual’s chance of developing skin cancer;
 - f. Compare the three types of skin cancer;
 - g. Identify social influences related to tanning and UV exposure;
 - h. Explain SPF and how it relates to skin protection;
 - i. Describe how to identify abnormal skin changes; and
 - j. Describe methods of protection from UV radiation exposure.

Materials:

- 1) Nurse practitioner-led lectures and PowerPoint presentations.
- 2) Media clips focusing on UV radiation, sun safety, and real skin cancer stories.
- 3) Group participation in ultraviolet light activities with use of solar Frisbees© and bracelets.
- 4) Self-viewing of skin damage in skin analyzer device.
- 5) Optional poster contest entry related to UV radiation and sun protective behaviors.
- 6) Sun safety and skin cancer prevention informational take-home packets for parents.
- 7) Policy Change Recommendations Sheet for administrators and school board.

Subject Matter:

- 1) What are the beneficial effects from the sun? The sun
 - a. warms the earth;
 - b. helps our bodies produce Vitamin D, needed for healthy bones and immune system;
 - c. helps plants grow;
 - d. provides energy and light;
 - e. regulates the start and end to a day, season changes, and climate; and
 - f. improves mood by increasing serotonin.

- 2) What are the harmful effects from the sun? The sun
 - a. produces a suntan and sunburn;
 - b. causes immune system suppression;
 - c. causes skin damage and skin cancer;
 - d. contributes to premature aging and wrinkling of our skin; and
 - e. causes eye damage such as photokeratitis and cataracts.

- 3) What is ultraviolet (UV) radiation? Ultraviolet radiation is
 - a. a form of electromagnetic energy;
 - b. invisible; and
 - c. made up of photons and travels in a wavelike pattern.

- 4) What can be harmful about exposure to UV radiation? UV radiation can
 - a. damage living skin cells;
 - b. cause changes to skin color;
 - c. cause skin cancer;
 - d. cause eye disorders; and
 - e. cause immune system suppression.

- 5) What is the ozone layer and how does it help us? The ozone layer
 - a. is a thin, naturally occurring gas shield high up in the sky;
 - b. protects life on Earth by shielding UV light;
 - c. is located in the stratosphere, several miles above the Earth's surface; and
 - d. has been damaged by human activities.

- 6) What are the types of UV radiation? The types of UV radiation are
 - a. UVA rays, which reach the Earth's surface and can penetrate the deep layers of the skin;
 - b. UVB rays, which sometimes reach the Earth's surface and can penetrate the outer layer of the skin; and
 - c. UVC rays, which do not reach the Earth's surface and are filtered out by the ozone layer.

7) What factors affect UV radiation intensity? UV intensity is affected by the following factors

- a. time of day, UV rays are more intense from 10am-4pm when the sun is at its highest;
- b. time of year, during summer months the sun is at a more direct angle to the Earth;
- c. latitude, such as living close to the equator;
- d. altitude, because there is less atmosphere to absorb the UV rays;
- e. weather conditions, such as clouds which can filter some UV rays;
- f. environment reflection, such as sand, snow, water, and pavement; and the
- g. ozone layer.

8) How do we measure UV radiation levels? UV radiation levels are

- a. measured with use of the UV Index Scale;
- b. reported on a scale from 1-11+;
- c. more harmful when the UV Index is 6 or higher; and
- d. located in the newspaper, weather forecasts on the news, and online resources.

9) What is skin cancer and how does it pertain to teens? Skin cancer is

- a. the uncontrolled growth of abnormal skin cells;
- b. the most common cancer in the United States; and
- c. on the rise in young adults.

10) What factors put me at a higher risk for developing skin cancer? Skin cancer risk factors include

- a. excessive exposure to UV radiation from the sun or tanning beds;
- b. light hair or eye color;
- c. fair, light skin complexion;
- d. multiple moles;
- e. family history of skin cancer; and
- f. history of sunburns.

11) What are the three types of skin cancer? The three types of skin cancer are

- a. basal cell carcinoma;
- b. squamous cell carcinoma; and
- c. melanoma, the most life threatening of skin cancers.

12) What are the ABCDEs of detecting melanoma? The ABCDEs of melanoma stand for

- a. asymmetry;
- b. border irregularity;
- c. color variation;
- d. diameter; and
- e. evolving lesions.

13) How can we protect ourselves from UV radiation? We can protect ourselves from UV radiation by

- a. limiting time in the midday sun, between 10am-4pm;
- b. seeking shade;
- c. covering up with protective clothing;
- d. wearing a hat;
- e. wearing sunglasses;
- f. using sunscreen;
- g. avoiding tanning parlors; and
- h. watching for the UV index.

14) What does SPF mean? SPF

- a. stands for sun protection factor;
- b. is a measure of a sunscreen's ability to prevent UVB rays from damaging the skin; and
- c. does not account for the amount of protection against UVA rays.

15) Why do people desire a tan? People desire a tan because of factors such as

- a. social influences;
- b. fashion;
- c. a low perceived risk for cancer;
- d. the perception that a tan feels healthy; and
- e. the perception that a tan looks good.

Vocabulary:

Ultraviolet (UV) Radiation
 Electromagnetic Energy (EM)
 UV Index
 UVA Rays
 UVB Rays
 UVC Rays
 Skin Cancer
 Basal Cell Carcinoma
 Squamous Cell Carcinoma
 Melanoma
 SPF
 Ozone Layer
 Sun Safe Behaviors

Procedures and Methods:

1) Students will take a letter of interest on the sun safety project home to parents for review. The student will return the parental consent and child assent forms to their designated science teacher prior to initiation of the program.

- 2) Students will be given didactic information through nurse practitioner-led class lecture, discussion, and a PowerPoint presentation incorporating video clips on the listed subject matter during two consecutive 50-minute science class sessions.
- 3) Students will participate in a group activity using ultraviolet reactive objects such as Frisbees® and bracelets to demonstrate the effects of available protective measures. Using the ultraviolet reactive items, students will note color changes under various conditions including different levels of shade, and SPF protection.
- 4) Students will participate in a self-viewing activity using a F-102 Skin Scanner Analyzer device to evaluate signs of skin damage from the sun. The device utilizes fluorescent lighting, a mirror, and a two way viewing screen to highlight pigmentation changes on the face as a result of sun exposure.
- 5) The students will be invited to participate in an optional poster competition among each grade level. The students will be encouraged to create a poster to display in one of two settings: (a) the high school setting highlighting the dangers of ultraviolet radiation just prior to the homecoming dance which has been noted as a time for increased tanning bed use or (b) the elementary school setting educating someone of a younger age on the importance of sun safety. The posters will serve as a means of targeting other students and increase community awareness during after-school events. One winner will be selected from each grade by their science teachers using criteria listed on the poster competition instruction form. Winners will be awarded a beach cabana tent valued at \$59, provided by the project coordinator. Final submissions for the poster competition will be one month following the program when the project coordinator returns to complete the final questionnaires.
- 6) Students and parents will be provided with educational brochures, journals, and hand-outs from the Skin Cancer Foundation and the American Cancer Society. Donated sunscreen, lip balm, aloe vera, and sun-safety products will be available for students to take home or keep with them at school upon approval from school principal.
- 7) All teachers, including gym teachers and coaches, will be provided with educational information on skin cancer and sun safety with aims of enforcing sun safe behaviors while outdoors during physical education class and sports activities.
- 8) The middle school principal and school board will be provided with a handout on Policy Change Recommendations encouraged by the Centers for Disease Control and Prevention. The school nurse and principal will be encouraged to review current school policies and revise as deemed necessary based on national recommendations for sun safety in the middle school years.

Assessment:

- 1) A questionnaire will be completed by the student, which bears no reflection on their grade, immediately before the program, following the final session of the program, and one month after completion of the program. The questionnaire will be used to measure demographic information, knowledge, attitudes, practices, and intended practices of the students.

2) Students will be evaluated throughout the program for their participation in class discussion, ultraviolet light exercise, skin evaluation viewing, and optional poster competition activity. Grading will be done in accordance with the classroom policies established by H. Middle School and Science teachers Mrs. H. and Mr. P.

Indiana State Standards Addressed:

7th Grade Science

SCI.7.1.2 2010 Describe and give examples of how energy can be transferred from place to place and transformed from one form to another through radiation, convection, and conduction.

SCI.7.1.5 2010 Describe and investigate how forces between objects-such as magnetic, electrical or gravitational forces-can act at a distance or by means of direct contact between objects.

SCI.7.2.2 2010 Recognize that the earth possesses a magnetic field that is detectable at the surface with a compass.

SCI.7.3.7 2010 Describe how various organs and tissues serve the needs of cells for nutrient and oxygen delivery and waste removal.

7th Grade Health

HW.7.1 2007 Students will comprehend concepts related to health promotion and disease prevention to enhance health.

HW.7.2 2007 Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.

HW.7.5 2007 Students will demonstrate the ability to use decision-making skills to enhance health.

HW.7.7 2007 Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

HW.7.8 2007 Students will demonstrate the ability to advocate for personal, family, and community health.

8th Grade Science

SCI.8.2.1 2010 Recognize and demonstrate how the sun's energy drives convection in the atmosphere and in bodies of water, which results in ocean currents and weather patterns.


SCI.8.2.4 2010 Describe the physical and chemical composition of the atmosphere at different elevations.

SCI.8.2.6 2010 Identify, explain, and discuss some effects human activities (e.g., air, soil, light, noise, and water pollution) have on the biosphere.

8th Grade Health

HW.8.1 2007 Students will comprehend concepts related to health promotion and disease prevention to enhance health.

HW.8.2 2007 Students will analyze the influence of family, peers, culture, media, technology and other factors on health behaviors.



Healthy Skin Is In: A Sun Safety Program

Lindsay Munden, Nurse Practitioner
Valparaiso University

Objectives

- Following this program the student will be able to:
 - Describe the harmful and beneficial effects from the sun
 - Define UV radiation and the factors that affect its intensity
 - Identify the basic anatomy of the skin
 - Explain the health risks from overexposure to UV radiation
 - Identify risk factors that affect an individual's chance of developing skin cancer

Objectives

- Compare the three types of skin cancer
- Identify social influences related to tanning and UV exposure
- Explain SPF and how it relates to skin protection
- Describe how to identify abnormal skin changes
- Describe methods of protection from UV radiation exposure



WHAT ARE SOME BENEFITS FROM THE SUN?

Benefits from the Sun

- Warms the earth
- Vitamin D synthesis
- Helps plants grow
- Provides light
- Improves mood

Environmental Protection Agency (2009).



WHAT ARE SOME HARMS FROM THE SUN?

Harms from the Sun

- Produces suntan and sunburn
- Effects our immune system
- Causes skin cancer
- Photosensitivity
- Makes your skin wrinkle
- Causes eye damage

Environmental Protection Agency (2009).

WHAT IS ULTRAVIOLET RADIATION?

Ultraviolet (UV) Radiation

- A form of energy, invisible to the human eye
- UV radiation cannot be seen or felt
- One type of electromagnetic energy
- UV radiation comes from the sun and tanning lamps
- UV radiation can cause changes to skin color, damage to eyes, and other bad health effects
- Can damage living skin cells and lead to cancer

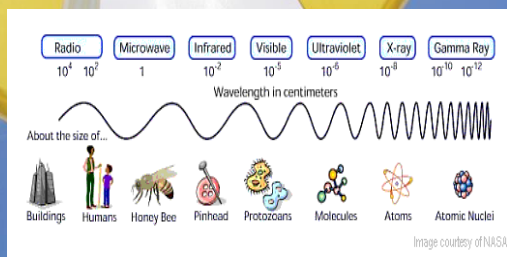
Environmental Protection Agency (2009).

Electromagnetic (EM) Energy

- All around us, though we can only see some of it
- Made up of minute packets of energy called photons
- Travel in a wave like pattern
- Divided into categories defining the activity level or how energetic they are

United States Food and Drug Administration (2012).

EM Wavelength Spectrum



United States Food and Drug Administration (2012).

WHAT IS THE OZONE LAYER?

What is the Ozone Layer?

- Thin gas shield
- High in the sky
- Protects life on Earth
- Ozone depletion

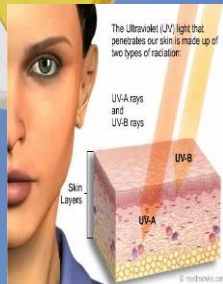


Environmental Protection Agency (2009).

WHAT ARE THE THREE TYPES OF ULTRAVIOLET RADIATION?

Types of UV Radiation

- **UVA rays**—cause Aging and skin cancer.
- **UVB rays**—cause sunBurn and skin cancer
- **UVC rays**—very dangerous, absorbed by the ozone and do not reach the ground



Skin Cancer Foundation (2012).
United States Food and Drug Administration (2012).

UV Radiation Damages DNA

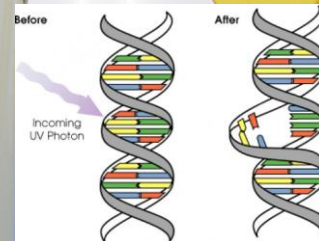


Image from <http://cancerguru.hubpages.com/hub/cancerguru-what-is-cancer>

WHAT FACTORS IMPACT THE INTENSITY OF ULTRAVIOLET RADIATION?

UV Radiation Levels Intensity

- Time of day
- Time of year
- Latitude
- Altitude
- Weather Conditions
- Environment Reflection
- Stratospheric Ozone

Environmental Protection Agency (2009).

Ultraviolet Radiation and Skin Cancer

- Increases your chances of damaging your skin from the sun
- Increases your chances of getting skin cancer
- Exposure to UV radiation as a child plays a role in getting skin cancer in the future
- Blistering sunburns are also a risk for getting skin cancer

ULTRAVIOLET (UV) RADIATION VIDEO FROM THE FDA

United States Food and Drug Administration (2012).

How Do We Measure UV Radiation Levels?

- We use the UV Index Scale
- Reported on a scale from 1-11+
- Take special care when the UV index is **6 or higher**
- Where can we find this?
- How can it help you?

UV INDEX	
0-2	No danger to the average person
3-5	Little risk of harm from unprotected sun exposure
6-7	High risk of harm from unprotected sun exposure
8-10	Very high risk of harm from unprotected sun exposure
11+	Extreme risk of harm from unprotected sun exposure

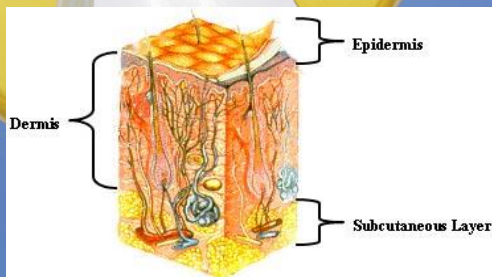
Environmental Protection Agency (2009).

Skin Anatomy

- Skin is the largest body organ!
- Important tasks:
 - Protects muscles, bones, organs
 - Regulates body temperature
 - Enables sense of touch
- Three layers:
 - Epidermis (top layer)
 - Dermis (middle layer)
 - Subcutaneous layer (lower layer)

United States Food and Drug Administration (2012).

Skin Anatomy



United States Food and Drug Administration (2012).

What skin type are you?

SKIN TYPE	SKIN COLOR	SKIN RESPONSE TO THE SUN
Type I	Pale white	Always burns-never tans
Type II	White to light beige	Burns easily-tans minimally
Type III	Beige	Burns moderately-tans gradually to light brown
Type IV	Light brown	Burns minimally-tans well to moderately brown
Type V	Moderate brown	Rarely burns-tans profusely to dark brown
Type VI	Dark brown or black	Never burns-tans profusely

Skin Cancer Foundation (2012).

DATE AWARENESS



CELEBRITY SKIN TYPE

SKIN TYPE I:

Click

SKIN TYPE II:

Click


 Skin Cancer Foundation (2012).
 

DATE AWARENESS



CELEBRITY SKIN TYPE

SKIN TYPE III:

Click

SKIN TYPE IV:

Click


 Skin Cancer Foundation (2012).
 

DATE AWARENESS



CELEBRITY SKIN TYPE

SKIN TYPE V:

Click

SKIN TYPE VI:

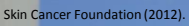
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 Skin Cancer Foundation (2012).
 



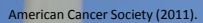
What is Skin Cancer?

- Definition: uncontrolled growth of abnormal skin cells
- Most common cancer in the United States
- On the rise in young adults
- 1 in 5 Americans will develop in their lifetime
- One person dies from skin cancer every hour


 Skin Cancer Foundation (2012).

Risk Factors for Skin Cancer

- Excessive exposure to UV radiation from the sun or tanning beds
- Hair and eye color
- Fair, light skin complexion
- Multiple moles
- Family history of skin cancer
- History of sunburns


 American Cancer Society (2011).

Types of Skin Cancer

- Three types of skin cancer:
 - Basal Cell Carcinoma
 - Squamous Cell Carcinoma
 - Melanoma

Basal Cell Carcinoma

- Most common form in the United States
- Occur in basal cells at the bottom of the epidermis
- Painless, slow growing cancer
- Found on exposed parts of the body
- May appear as a skin growth that doesn't heal properly or bleeds

American Cancer Society (2011).

Squamous Cell Carcinoma

- Second most common skin cancer in U.S.
- Occurs in squamous cells, which form the middle layer of the epidermis
- Fast growing cancer
- A bump that is rough, scaly, or with red patches

American Cancer Society (2011).

Pictures of BCC and SCC



Images from Skin Cancer Foundation (2012).

Melanoma

- Most serious form of skin cancer
- Heredity can play a major role
- Often triggered by intense, intermittent sun exposure
- In early stages, treatable
- Left untreated, can spread and become life threatening!



Skin Cancer Foundation (2012).
American Cancer Society (2011).







[Click here](#)

**CHELSEA'S EXPERIENCE WITH SKIN
CANCER**

Skin Cancer Foundation (2011).

What to look for: ABCDE

- **A**symmetry
- **B**order Irregularity
- **C**olor
- **D**iameter
- **E**volving

Normal Mole	Melanoma	Sign	Characteristic
		Asymmetry	When half of the mole does not match the other half
		Border	When the border (edges) of the mole are ragged or irregular
		Color	When the color of the mole varies throughout
		Diameter	If the mole's diameter is larger than a pencil eraser

Photographs used by permission: National Cancer Institute

Skin Cancer Foundation (2002).
American Cancer Society (2011).

Sun Safety Action Tips

- Limit time in mid day sun
- Seek shade
- Cover up
- Wear a hat
- Wear sunglasses
- Use sunscreen
- Avoid tanning parlors
- Watch for the UV index

Environmental Protection Agency (2009).
Skin Cancer Foundation (2012).

"Click [here](#)"

SUN SAFE BEHAVIORS

United States Food and Drug Administration (2012).

Ways to Protect Your Skin

SEEK SHADE

- Between 10am-4pm



COVER UP

- Hats
- Sleeves
- Pants

Skin Cancer Foundation (2012).

SUNGLASSES

- UV blocking
- 99-100% protection



AVOID BURNS

- Wear sunscreen
- Burns can increase your risk for cancer

Skin Cancer Foundation (2012).

USE SUNSCREEN

- Apply 1-2 oz. of "Broad Spectrum" water resistant SPF 15+
- 20-30 minutes before going outdoors
- Reapply 1-2 oz. every 2 hours, or after swimming, playing, exercising, or sweating.



AVOID TANNING BEDS

- Same risks or greater than exposure to the sun
- Often tanning bed lights are at a higher intensity than the sun's rays

Skin Cancer Foundation (2012).

What Does SPF Stand For?

- Sun Protection Factor
- SPF is a measure of a sunscreen's ability to prevent UVB from damaging the skin.
- Here's how it works: If it takes 20 minutes for your unprotected skin to start turning red, using an SPF 15 sunscreen theoretically prevents reddening 15 times longer-about 5 hours.

Skin Cancer Foundation, 2012.
United States Food and Drug Administration, 2012.

SPF Percentages

- SPF 15 filters out approximately 93% of all incoming UVB rays
- SPF 30 filters out 97% of UVB
- SPF 50 filters out 98% of UVB
- SPF 100 filters out 99% of UVB

Skin Cancer Foundation, 2012.
United States Food and Drug Administration, 2012.

SPF Facts

- No sunscreen, regardless of strength, should be expected to stay effective longer than 2 hours without reapplication.
- Reddening of the skin is a reaction to UVB rays alone and tells you little about what UVA damage you may be getting.

Skin Cancer Foundation, 2012.
United States Food and Drug Administration, 2012.

Why Do People Desire a Tan?



Images from shop.mtv.com, blogs.dallasobserver.com, freewebs.com

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Appendix D

PLEASE SIGN AND RETURN BY FRIDAY SEPTEMBER 7, 2012

PARENT CONSENT AND AUTHORIZATION FORM

Project Title: Healthy Skin is IN: A Multifaceted Sun Safety Program for Adolescents

Project Coordinator: Lindsay Munden, MSN, RN, FNP-BC, DNP student, Valparaiso University College of Nursing

Purpose: I, _____ (please print), understand that I am being asked to grant permission for my child, _____ (please print), to take part in an educational intervention project for middle school students which will measure the effects of a multifaceted sun safety program on students' knowledge, attitudes, practices, and intentions.

Procedure: The project coordinator will provide the following to participants: two consecutive 50-minute educational sessions during science class at H. Middle School in September 2012. The content introduced within these educational sessions is based on recommendations and evidence guidelines set forth by the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and the Environmental Protection Agency (EPA). The program will incorporate live narration nurse practitioner-led PowerPoint slide presentations, multimedia content (such as video clips), in-class activities focusing on the impact of UV radiation, appearance focused evaluations with use of a F-102 Skin Scanner Analyzer device, optional poster contest participation, and take-home informational packets for parents. The project coordinator will administer a questionnaire immediately before the initial class session and following the final class session, as well as one month after the activity. The questionnaires will take approximately 5 to 10 minutes to complete and students will be assigned and identified by a number which will be kept confidential. The intervention and data collection will take place over a total period of about 2 months.

Risks: There are no known physical risks to participating in the project. There are no invasive techniques used. The F-102 Skin Scanner Analyzer device used to view sun-related skin damage is made of fluorescent light bulbs which the Federal Drug Administration (FDA) has reported carry no warnings at typical use distances. This project is designed to increase knowledge about skin cancer and sun safe practices of middle school children. Unintended consequences may include participants going to extreme measures to protect themselves from the sun and unnecessary worry about getting skin cancer. The project involves collection of information from participants prior to and following the educational intervention by means of questionnaires that will measure the overall effectiveness of the program.

Benefits: The knowledge gained from this project could provide valuable information about the use of a school based sun safety educational program for middle school children to educators, health care providers, and health organizations. The program may increase knowledge,

attitudes, and intended practices of sun safe behaviors. The program could possibly minimize the risks for developing skin cancer in the future.

Payment for Participation: I understand that I will not be paid for my child's participation in the project. My child may receive free educational brochures, sunscreen samples, and solar ultraviolet radiation detecting beads or Frisbees donated by charitable organizations and the project coordinator. If my child chooses to participate in the optional poster competition and is selected as a winner, prizes such as beach cabana tents valued at \$59 may be awarded.

Additional Costs: I understand that there will be no costs to me for my child's participation in this project.

Voluntary Participation/Withdrawal: I understand that my child's participation in this project is my child's choice, and my child is free to stop at any time without penalty. Additionally, my child's science grade will not be impacted by completing or electing not to complete the questionnaires associated with the educational sessions.

Questions: If I have any questions about my child being in the project now or in the future, Lindsay Munden may be contacted at 219-405-3506 or through her email address Lindsay.Munden@valpo.edu. If I have questions about my rights as a project participant, Julie Brandy, PhD, RN, FNP-BC, Chair of the Institutional Review Board at Valparaiso University, may be contacted at 219-464-5289.

Confidentiality/Anonymity: Although information and answers that my child will give on the questionnaires may be used and reported by the project coordinator, my child's name and facts that would identify my child will be kept strictly confidential. I have been assured of my child's anonymity in the reporting of data. I understand that photographs of my child participating during the in-class activities may be shared during a presentation at Valparaiso University following the program.

Consent to Participate in Project Study: I have read or had read to me all of the above information about this project, the procedure, possible risks, and potential benefits to my child, and I understand them. All of my or my child's questions have been answered. I give my consent freely, and give permission for my child to participate in this project.

Participant's Parent/Guardian Signature

Date

Project Coordinator's Signature

Date

Appendix E

CHILD ASSENT FORM

Healthy Skin is IN: Effects of a Multifaceted Sun Safety Program for Adolescents
Project Coordinator: Lindsay Munden, MSN, RN, FNP-BC

My name is Lindsay Munden and I too was once a H. Middle School student, but now I am a nurse practitioner. I am trying to learn more about your understanding of sun safety and the ways you protect yourself from the sun. I am interested in this because many teenagers are not protecting their skin from sun damage and this can lead to health problems like skin cancer. If you would like, you can help me learn more about this topic.

Educational material will be incorporated into science class for all 7th and 8th grade students at H. Middle School in September 2012. This will include information about sun safety and tips for protecting the skin from sun damage with the use of: a PowerPoint presentation, in-class activities using solar detecting devices, and the option to participate in a poster competition. If you choose to participate in the project evaluation, you will be asked to fill out a survey before the first class, after the last class, and one month following the program. The survey will ask questions about your knowledge, behaviors, and feelings about the sun. The survey forms will take about 5-10 minutes to complete and will be given during your regular time in science class. This survey will help me see if the program was helpful to you.

There are no risks of harm from being in this project. By signing this form, you will also be given the opportunity to view your face and look for signs of skin damage from the sun with a skin analyzer machine. The skin analyzer machine we will be using contains fluorescent light bulbs which are safe and not harmful to your eyes, skin, or other body parts. This machine will help us see if previous sunburns have already started to hurt your skin.

Other people will not know if you are in my project. I will put things I learn about you together with things I learn about other teens, so no one can tell what information came from you. In fact, you will be assigned a number which only I will have access to. When I tell other people about my project, I will not use your name, so no one can tell who I am talking about.

Your parents or guardian have to say it is okay for you to be in the project. After they decide, you get to choose if you want to do it too. This program will not be graded and your grade will not be affected if you do not want to complete the survey form. If you do not want to participate in the project evaluation, no one will be mad at you. If you want to be included in the project evaluation now and change your mind later, that's okay too. You can stop at any time. My telephone number is 219-405-3506. You can call me if you have questions about the project or if you decide you do not want to be in the project any more. I will give you a copy of this form in case you want to ask questions later.

I have decided to be in the project even though I know that I do not have to do it. Lindsay Munden has answered all my questions.

Signature of Student

Date

Signature of Project Coordinator

Date

Appendix F
Healthy Skin is IN Poster Competition

You are invited to participate in the Healthy Skin is IN 2012 Poster Contest. This is an optional contest which helps demonstrate what you have learned from the sun safety program taught during Science Class. Your posters will be displayed at either the elementary or high school building depending on who you choose to impact with your message. Your posters will also raise awareness about skin cancer and sun protection within the community because community members will see these posters during after-school activities and sporting events. Please submit your poster no later than **September 28, 2012**. Your teachers will select one winner from each grade at the end of September when the program has completed. Each winner will be awarded a beach cabana tent provided by the project coordinator. We look forward to seeing your creative work!

Submitted posters must meet the following criteria:

- Be original
- Drawn by hand on 11 x 14 inch poster size
- Include your name and grade level on the back of the poster
- Use correct spelling and grammar

Students will select one of the following topics:

- 1) Create a poster teaching elementary age children about sun-safe behaviors taught during the program (try to include at least three sun-safe behaviors). **OR**
- 2) Create a poster teaching high school age children about the risks of ultraviolet radiation exposure and tanning bed use.

Posters will be judged on:

- Creativity
- Originality
- Quality of artwork
- Content meeting the criteria

Prizes:

- Grand Prize: Beach cabana tent (pictured below and valued at \$59)



Please contact Lindsay Munden, project coordinator at 219-405-3506 with any questions.

Appendix G

'Healthy Skin is IN': A Sun Safety Program for Middle School Children

Dear Parents,

I recently had the opportunity to spend time in your child's science classroom teaching about sun safety during the month of September. The purpose of this sun safety program was to provide children with the knowledge and behavioral skills needed to prevent skin cancer. We discussed many sun safe related topics and following this project your child should now be able to:

- describe the harmful and beneficial effects from the sun;
- define UV radiation and the factors that affect its intensity;
- identify the basic anatomy of the skin;
- explain the health risks from overexposure to UV radiation;
- identify risk factors that affect an individual's chance of developing skin cancer;
- compare the three types of skin cancer;
- identify social influences related to tanning and UV exposure;
- explain SPF and how it relates to skin protection;
- describe how to identify abnormal skin changes; and
- describe methods of protection from UV radiation exposure.

I would like to ask for your help at home reinforcing healthy sun-related behaviors taught during this program. Some of the ways that you can continue sun safe behaviors in your home include:

- limiting time spent in the midday sun, especially between the hours of 10am-4pm;
- using sunscreen with UVA/UVB (broad spectrum protection) and an SPF of at least 15, applied twenty minutes prior to sun exposure and reapplied every 2 hours;
- using protective clothing such as long sleeved shirts, pants, and hats when going outdoors;
- using UV blocking sunglasses providing 99-100% protection from the sun's rays;
- using the UV Index scale provided in local weather forecasts before going outdoors;
- avoiding the use of tanning beds and "sun bathing" to achieve a tanned appearance; and
- ongoing observation of freckles and moles and the reporting of any skin changes (such as size, shape, texture, or color) to your family health care provider.

Additional materials on sun safety and skin cancer prevention are provided in this packet. Skin cancer and the other harmful health effects from overexposure to the sun are largely preventable, and by making sun safe decisions, positive steps are taken toward a healthier future. Please contact me at 219-405-3506 or Lindsay.Munden@valpo.edu if you have any questions or concerns, or if you would like further information on this project or sun protection in general. Thank you for your support and allowing your child to participate in this program.

Appendix H

School Policy Recommendations for Sun Safety

A substantial portion of children's time is spent at school or participating in school-based activities. Outdoor activities such as break times, lunch, and sporting events frequently occur at times when UV radiation levels are highest. Thus, the school environment and the manner in which a school operates can have a significant impact on children's UV radiation exposure. The formulation of sun protection policies can express a school's commitment to sun protection.

- **Schedule and Structure Policies**
 - Rules that encourage the scheduling of outdoor activities (including athletic and sporting events) during times when the sun is not at its peak intensity. As resources permit, outdoor activities shall be preferentially scheduled to occur before 10:00am or after 4:00pm. However, scheduling constraints shall not reduce the total time students engage in physical education or activity.
 - Building and grounds codes to increase the availability of shade in frequently used outdoor spaces.
 - Priority should be given to including ample shade in new construction plans and adding shade when remodeling school facilities.
 - School and community staff could evaluate frequently used spaces in the community for their UV protection status and add signs, reminders, or prompts to encourage sun safety.
- **Policies for Personal Protective Clothing and Sunglasses**
 - Develop policies that encourage or require students to wear protective clothing, hats, and sunglasses when outdoors to prevent excessive sun exposure. These measures could be employed during physical education classes, recess, field trips, outdoor sports or band events, and camping or field trips.
 - Schools may specify the type(s) of clothing and hats that are, or are not, permissible on campus. The principal may assess school uniforms, including physical education uniforms, to determine if and how they might be modified to better protect students from exposure to UV rays.
 - Related policy initiatives could require the use of athletic, band, and physical education uniforms that reduce or minimize excessive sun exposure.
 - When students are outdoors they may be allowed to wear sunglasses that protect the eyes from UV rays. Schools may specify the type(s) of sunglasses that are, or are not, permissible on campus.
- **Sunscreen Policies**
 - Policies on sunscreen and protective lip balm use at school or for after-school activities can range from encouraging parents to include sunscreen in required school-supply kits, using permission slips for students to be able to apply sunscreen at school, and establishing a sunscreen use routine before going outside.

- Policies might require teachers and coaches to use sunscreen for outside activities and require that sunscreen be provided at official school-sponsored events that occur during midday.
- Modify existing policies that restrict school-based sunscreen application, seeking support for purchasing sunscreen supplies, and supervising sunscreen use.
- **Education Policies**
 - The ideal education policy should support planned and sequential health education to provide students with the knowledge, attitudes, and behavioral skills needed for skin cancer prevention.
 - Teachers shall provide education at each grade level that relates to skin cancer, including information about the harmful effects of UV rays and recommended practices for preventing skin cancer.
 - Policies that require teaching skin cancer prevention within health education courses will need to be balanced with the overall educational mission of the school.
 - Teachers, coaches, and school staff have a prime opportunity to reach children when they are at their most impressionable age. Role modeling of appropriate sun behavior by staff is a vital element in educating students and parents as well as protecting staff from excessive sun exposure.
- **Policies for Outreach to Families**
 - Schools shall inform parents and guardians about the importance of, and strategies for, preventing skin cancer, and shall alert them that the risk of developing skin cancer is highest for individuals with lightly or moderately pigmented skin. The communications may include details of the school policy relating to hats, sun protective clothing, sunscreen usage, uniforms, and sunglasses.
 - Policies can ensure that schools routinely provide to their youth advice and information concerning skin cancer prevention.
 - Information concerning skin cancer prevention might be distributed along with other health forms to parents at the beginning of the year or at parent and teacher visits.
- **Resource Allocation and Evaluation**
 - Skin cancer prevention efforts will most likely be sustained if policies exist to guide the allocation of resources for skin cancer prevention.
 - A funding policy usually includes accountability and ongoing evaluation, thus providing for periodic review and reconsideration of how effective the resources dedicated to skin cancer prevention are being used.

References for School Policy Recommendations

Centers for Disease Control and Prevention. (April 26, 2002). Guidelines for school programs to prevent skin cancer. *MMWR Morbidity and Mortality Reports: Recommendations and Reports*, 51(RR04), 1-15.

World Health Organization (2003). Sun protection and schools: How to make a difference. Retrieved June 22, 2012 from <http://www.who.int/uv/publications/en/sunprotschools.pdf>

Appendix I

Dear _____,

Thank you for allowing me the opportunity to integrate sun safety teaching in your Science classroom during September of 2012. The purpose of the program, 'Healthy Skin is IN' is to provide a multifaceted educational intervention using a synthesis of current evidence to provide middle school students with the knowledge and behavioral skills they need to protect their skin from ultraviolet radiation and prevent skin cancer. I have attached a copy of my *curriculum* and *program objectives* which are adapted from the World Health Organization, Environmental Protection Agency, Centers for Disease Control and Prevention, and the Skin Cancer Foundation, among many other key stakeholders. I have also strived to incorporate many of the state Science standards related to this content to meet your classroom requirements.

My plan is to provide two consecutive 50 minute class sessions incorporating PowerPoint presentations, multimedia content (such as video clips), in-class activities focusing on the impact of UV radiation (such as solar changing Frisbees© and bracelets), appearance focused evaluations with use of a skin viewing device, optional poster contest participation, and take home informational packets for parents. The overall effectiveness of this project will be measured with a pretest-posttest questionnaire administered to students one week before, immediately following the second class session, and one month after the intervention. The questionnaire will take approximately 5-7 minutes to complete.

I will need your assistance with this project on the following:

- Approval of the course curriculum and PowerPoint presentation by signing and returning the attached *teacher approval form as soon as possible*
- Assistance with selecting dates for implementation of this project (preferably two consecutive 50 minute class sessions) to reach all 7th and 8th grade students
- Administration of a *letter of interest to parents* that your students will take home prior to the class sessions (these will be copied and provided for you)
- Collection of *parent/guardian consent forms* and *child assent forms* as students return them prior to **September 7th** (these will be copied and provided for you)
- Assistance with PowerPoint and Internet access in your classroom the day of the class sessions
- Assistance with selecting a date one week prior to the class sessions and 4 weeks following for students to complete a *questionnaire form* which will measure the project outcomes
- Assistance with helping students during in-class activities such as the UV detecting items and skin analyzer viewing device during the second class session
- Selection of one grand prize poster winner from each grade level with use of the *poster competition criteria* provided and awarding of a beach cabana tent provided by the project coordinator

I would like your input on what dates are most convenient for this program as soon as possible. My goal is to capture every student in 7th and 8th grade. The month of September was

selected to attempt to reach students while the weather is still warm so that children have the ability to adapt the behaviors taught. I have also attached copies of the *letter of interest for parents*, *child assent form*, and *parental consent form* which will need to be sent home and returned with signatures prior to the program date. I will pre-print and provide these for you accommodating the appropriate number of students in either 7th or 8th grade. If you feel this is something I should administer at registration, rather than you sending home with students prior to the class session please let me know. Students that do not return consent and assent forms will still be allowed to participate in the educational component of this project, however they will not be able to complete a questionnaire form.

Attached you will find a letter acknowledging that you are in support of this project and are willing to allow me to teach the content described in your classroom. This acknowledgement is needed as part of my doctorate project. Please sign the attached letter of acknowledgement and either scan and email to Lindsay.Munden@valpo.edu or postal deliver to 12607 Pennsylvania Place, Crown Point, IN 46307. I would appreciate your feedback on the curriculum if any changes are needed. Also, please communicate to me the most appropriate dates to implement this project to reach the goal of educating all 7th and 8th grade students attending H. Middle School. I would embrace the opportunity to meet with you at least once over the summer or at the start of the school year to discuss the project further. Please let me know your availability and willingness to meet face-to-face to help facilitate this sun safety program. Again, thank you for allowing me the opportunity to teach your students about sun safety.

Sincerely,

Lindsay Munden, MSN,RN, FNP-BC
Doctorate of Nursing Practice Student
Valparaiso University

Appendix J

Teacher Approval Form

I, _____, have been authorized by H. Middle School principal, _____, to allow the implementation of a multifaceted sun safety educational program for ___ grade students during science class in September 2012. I understand that this project fulfills the requirements needed by the project coordinator, Lindsay Munden, to complete her Doctorate of Nursing Practice degree through Valparaiso University College of Nursing.

I have thoroughly reviewed the content of this educational program including a PowerPoint presentation and course curriculum outline. I am aware that the educational program will be held during two 50-minute class periods for all ___ grade students. I understand that a pretest-post-test questionnaire will be administered to students before the initial class session, immediately after the second class session, and one month following the program to measure the outcomes of the activity. I will assist the project coordinator during planning, implementation, and evaluation of this sun safety program through participation in the following activities:

- approval of the course curriculum and PowerPoint presentation by signing and returning the provided *teacher approval form*;
- assistance with selecting dates for implementation of the project to reach all 8th grade students;
- administration of a provided *letter of interest to parents* that students will take home prior to the class sessions;
- collection of *parent/guardian consent forms* and *child assent forms* in a sealed envelope provided by the project coordinator as students return the forms prior to **September 7, 2012**;
- assistance with PowerPoint and Internet access in the classroom during class sessions;
- assistance with selecting a date 4 weeks following the program for students to complete a *questionnaire form*;
- assistance with helping students during in-class activities such as with the use of UV detecting items;
- administration of *take-home informational packets for parents* to students following the final class session; and
- selection of one grand prize poster winner from my grade level with use of provided *poster competition criteria* and awarding of a beach cabana tent to the selected winner.

This letter serves as evidence that the proposed content of the sun safety educational program, *Health Skin is IN*, has been reviewed and approved for use in my ___ grade science classroom.

(Print name)

(Signature)

(Date)

Appendix K

'Healthy Skin is IN'

A Sun Safety Program for Middle School Children

Dear Parents,

My name is Lindsay Munden, a H. School graduate and now a family nurse practitioner within the community. I am currently working on my Doctorate in Nursing Practice degree at Valparaiso University. In fulfillment of that degree, I will be implementing a project study educating H. Middle School 7th and 8th graders about sun safety and skin cancer prevention during science class early in September 2012. I would like to take this opportunity to provide you with some background information on skin cancer and the purpose of this project.

Overexposure to the sun can cause serious health problems such as skin cancer, premature aging of the skin, cataracts and other eye damage, and immune system depression. The amount of time children spend outside the classroom, including recess, lunch, physical education classes, field trips, and after-school activities, can result in a significant amount of sun exposure. We know children need to be physically active, but they must learn to protect themselves from over exposure to ultraviolet (UV) radiation. Did you know that more than one half of a person's lifetime of sun exposure occurs during childhood and adolescence?

Skin cancer is currently the most common type of cancer in the United States, with rates increasing each year. Up to 90% of melanomas (the most lethal of all skin cancers) are caused by UV radiation. Studies also show that the occurrence of at least two blistering sunburns before the age of 18 may double the risk of developing melanoma as an adult. Clearly, evidence demonstrates that a high level of sun exposure during childhood plays a role in the future development of skin cancer.

During adolescence, there is a steady decline in the use of sun protection and increased use of indoor tanning lights. Peer influences and social media portray to teens that a tan looks good and feels healthy. Education on the risks of UV radiation can help individuals to develop the knowledge, attitudes, values, and skills that are needed to make positive sun-related decisions, and to apply these into daily practice. Middle school is an especially important time to provide this type of education, since adolescents are beginning to take responsibility for their health and establish their own lifetime health habits.

Schools are in a position to teach and model healthy behaviors and they can use health education activities involving families to encourage sun-safe behaviors at home. The 'Healthy Skin is IN' sun safety program was developed using evidence based guidelines from the World Health Organization, Centers for Disease Control and Prevention, and Environmental Protection Agency, among many other key stakeholders. The purpose of the program is to provide a multifaceted educational intervention using a synthesis of current evidence to provide middle school students with the knowledge and behavioral skills needed to prevent skin cancer.

The program will include two 50-minute class sessions educating students with use of PowerPoint slides, multimedia, nurse practitioner-led lectures, and in-class group activities. The students will be encouraged to participate in an optional sun safety poster contest. Your child will also have the option to view his or her face in a skin analyzer device to observe skin changes related to past sun exposure. The skin device does not pose any potential risks or harms and is safe for use in children. Following this program, students will be able to

- describe the harmful and beneficial effects from the sun;
- define UV radiation and the factors that affect its intensity;
- identify the basic anatomy of the skin;
- explain the health risks from overexposure to UV radiation;
- identify risk factors that affect an individual's chance of developing skin cancer;
- compare the three types of skin cancer;
- identify social influences related to tanning and UV exposure;
- explain SPF and how it relates to skin protection;
- describe how to identify abnormal skin changes; and
- describe methods of protection from UV radiation exposure.

To evaluate the outcomes of this program and to share my findings within the community, your child will be asked to complete a questionnaire before the first class session, following the final class session, and at one month following the educational program. This questionnaire will be used to collect demographic data and measure knowledge, skills, behavior intent, and attitudes about sun safety. No personal identifying information will be collected on the form to ensure confidentiality is maintained.

I would like to ask for your help at home reinforcing healthy sun-related behaviors taught during this program, especially during after-school activities and sports events. Included in this packet are consent and assent forms, which are required for your student to participate in the questionnaire and skin analysis portion of the program. Additional material on sun safety and skin cancer prevention will be provided following the program for you to review with your child. With your child, please review the consent and assent forms (which require parent/guardian and child signatures) and have the student return them to their science teacher prior to **September 7, 2012** for participation in the questionnaire and self-viewing portion of the activity.

Skin cancer and the other harmful health effects from overexposure to the sun are largely preventable, and by making these changes, positive steps are taken toward a healthier future. Please contact me at 219-405-3506 or Lindsay.Munden@valpo.edu if you have any questions or concerns, or if you would like further information on this project or sun protection in general. Thank you for your support and allowing your child to participate in this project.

Sincerely,

Lindsay Munden, MSN, RN, FNP-BC
 Doctorate of Nursing Practice Student
 Valparaiso University College of Nursing

Appendix

Pre-Test Survey

ID # _____

Please use a pencil to fill in the circle for each answer you choose.

1. How old are you?
 10 11 12 13 14 15
2. What grade are you in?
 7th 8th
3. Are you a boy or a girl?
 Boy Girl
4. What is the color of your hair?
 Red or light blonde Dark blonde or light brown Black
 Blonde Dark brown
5. What ethnicity are you?
 Hispanic Black American Indian
 White Asian Pacific Islander
6. How does your skin respond to the sun?
 Always burn/never tan Sometimes burn/always tan Unknown
 Always burn/sometimes tan Never burn/always tan

- | <u>When you were outside in the sun last summer:</u> | Never | Rarely | Sometimes | Often | Always |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 7. Did you wear protective clothing (like a hat or a long-sleeved shirt)? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. Did you wear sunglasses? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. Were you in the sun between 10AM and 4PM? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. Did you wear sunscreen? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. How many times did you get sunburned? | | | | | |
| <input type="radio"/> None <input type="radio"/> One or two <input type="radio"/> Three or more | | | | | |

How often did you do the following things in the past month:

12. "Lay out" in the sun to get a tan.

Always Often Sometimes Rarely Never

13. Use a tanning bed or sunlamp to get a tan.

Always Often Sometimes Rarely Never

Read the following statements. Mark the circle that best matches with your answer.

	True	False	Not Sure
14. A sunscreen with a sun protection factor (SPF) of 2 will prevent a sunburn longer than a SPF of 15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. It is recommended that you put on sunscreen only once a day and then not reapply it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. It is most harmful to your skin to be in the sun between 10:00AM and 4:00PM.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. You can get a sunburn even on a cloudy day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. People with light colored skin are at lower risk for getting skin cancer than people with darker colored skin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Getting a lot of sunburns increases your chances of getting skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Tanning beds are a safe way of getting a tan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. People cannot die from skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Too much sunlight can cause skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Circle your answer to the following questions:

23. Do you feel it is important to have a sun tan?	YES	NO
24. Do you think a suntan is good for you?	YES	NO
25. Do you think that you have a chance of getting skin cancer when you are older?	YES	NO

<u>When you go outside in the sun next summer:</u>	Yes	Most Likely	Probably Not	No
26. Will you put sunscreen on when you go outside?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Will you stay out of the sun between 10AM and 4PM?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. Will you wear protective clothing (like a hat or long-sleeved shirt)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. Will you wear sunglasses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Will you avoid tanning beds?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix M

Questionnaire Content Validity Statement

I, _____ have thoroughly reviewed the self-report pretest/posttest questionnaire form developed for the sun safety program, *Healthy Skin Is IN*, created by the project coordinator Lindsay Munden. This form has been adapted from instruments utilized in previously researched sun safety programs. Permission for use of these instruments in this project was sought by the project coordinator and provided by the following investigators:

Buller, D.B., Reynolds, K.D., Yaroch, A., Cutter, G.R., Hines, J.M., Geno, C.R., ... Grandpre, J. (2006). Effects of the Sunny Days Healthy Ways curriculum on students in grades 6 to 8. *American Journal of Preventive Medicine*, 30(1), 13-22.

Gellar, A., Rutsch, L., Kenausis, K., & Zhang, Z. (2003). Evaluation of the SunWise school program. *The Journal of School Nursing*, 19(2), 93-99.

As a local pediatrician, I have established that the content of the adapted tool is valid and age-appropriate for use in adolescents during this evidence-based practice project. I have approved the content of this tool and its ability to measure sun related practices, attitudes, knowledge, and intended practices. I approve the administration of this instrument to students before (pre) and following (post) the educational intervention to measure the effectiveness of the program. I understand that this project fulfills the requirements needed by the project coordinator to complete her Doctorate of Nursing Practice degree through Valparaiso University.

This letter serves as evidence to the Valparaiso University Institutional Review Board (IRB) that the content validity of the adapted tool proposed for use in this project has been established by an expert in pediatrics.

(Print name)

(Sign name)

(Date)

Appendix N

Post-Test Survey 1

ID # _____

Read the following statements. Mark the circle that best matches with your answer.

- | | True | False | Not Sure |
|---|-----------------------|-----------------------|-----------------------|
| 1. A sunscreen with a sun protection factor (SPF) of 2 will prevent a sunburn longer than a SPF of 15. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. It is recommended that you put on sunscreen only once a day and then not reapply it. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. It is most harmful to your skin to be in the sun between 10:00AM and 4:00PM. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. You can get a sunburn even on a cloudy day. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. People with light colored skin are at lower risk for getting skin cancer than people with darker colored skin. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. Getting a lot of sunburns increases your chances of getting skin cancer. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. Tanning beds are a safe way of getting a tan. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. People cannot die from skin cancer. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. Too much sunlight can cause skin cancer. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Circle your answer to the following questions:

- | | | |
|--|-----|----|
| 10. Do you feel it is important to have a sun tan? | YES | NO |
| 11. Do you think a suntan is good for you? | YES | NO |
| 12. Do you think that you have a chance of getting skin cancer when you are older? | YES | NO |

<u>When you go outside in the sun next summer:</u>	Yes	Most Likely	Probably Not	No
13. Will you put sunscreen on when you go outside?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Will you stay out of the sun between 10AM and 4PM?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Will you wear protective clothing (like a hat or long-sleeved shirt)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Will you wear sunglasses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Will you avoid tanning beds?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix O

Post-Test Survey 2

ID # _____

Read the following statements. Mark the circle that best matches with your answer.

	True	False	Not Sure
1. A sunscreen with a sun protection factor (SPF) of 2 will prevent a sunburn longer than a SPF of 15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. It is recommended that you put on sunscreen only once a day and then not reapply it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. It is most harmful to your skin to be in the sun between 10:00AM and 4:00PM.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. You can get a sunburn even on a cloudy day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. People with light colored skin are at lower risk for getting skin cancer than people with darker colored skin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Getting a lot of sunburns increases your chances of getting skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Tanning beds are a safe way of getting a tan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. People cannot die from skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Too much sunlight can cause skin cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Circle your answer to the following questions:

10. Do you feel it is important to have a sun tan?	YES	NO
11. Do you think a suntan is good for you?	YES	NO
12. Do you think that you have a chance of getting skin cancer when you are older?	YES	NO

When you go outside in the sun next summer:

	Yes	Most Likely	Probably Not	No
13. Will you put sunscreen on when you go outside?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Will you stay out of the sun between 10AM and 4PM?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Will you wear protective clothing (like a hat or long-sleeved shirt)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Will you wear sunglasses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Will you avoid tanning beds?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often did you do the following things in the past month:

18. "Lay out" in the sun to get a tan.

- Always Rarely Sometimes Often Never

19. Use a tanning bed or sunlamp to get a tan.

- Always Rarely Sometimes Often Never

Appendix P

Healthy Skin Is IN Survey Code Sheet: Grade 7 and 8

ID #:

Student Name:

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