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## Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada

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ASSESSING THE IMPACT OF THE SUNWISE PROGRAM ON YOUTH SUN SAFETY  
KNOWLEDGE, ATTITUDES, AND BEHAVIORS IN CLARK COUNTY, NEVADA

By

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A thesis submitted in partial fulfillment of the requirements of the

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## Thesis Approval

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Attitudes, and Behaviors in Clark County, Nevada

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## Abstract

*Introduction:* Skin Cancer rates in Nevada continue to increase and remain above the national average. One important method to combat rising rates is education related to the prevention of sunburns, the main risk factor for developing skin cancer. This study aimed to assess the impact of the SunWise Program, a sun safety education program developed by the Environmental Protection Agency, to increase knowledge, improve attitudes, and change behaviors of participants based on constructs of the Health Belief Model.

*Methods:* Participants included youth from ages 7-18 years old who attended 6 Boys and Girls Clubs of Southern Nevada. Boys and Girls Club locations were matched on percentage of students who qualified for free or reduced price lunch; three clubs served as intervention sites and three served as control sites. All locations completed a pre- and post-test measuring knowledge, attitude, and self-reported behaviors related to sun safety. Systematic observations took place at all locations before and after the intervention during outside activities to evaluate changes in objectively measured sunsafe behaviors. Intervention sites received a 20-minute educational lesson from the SunWise Program and participated in interactive games explaining how to prevent sunburns.

*Results:* There were a total of 228 participants who completed the pre- and post-test, 94 in the intervention group and 134 in the control group. This intervention was successful in increasing knowledge on the following topics demonstrated with a significance level of  $p < 0.05$ . Data were analyzed using paired  $t$ -tests and McNemar Tests. The intervention group's results showed significant increases in knowledge by correctly identifying that wearing a shirt, hat, and sunscreen will keep skin safe in the sun ( $t(93) = 3.32, \mu = 0.27$ ), understanding how to read the UV index ( $\chi^2(93) = 41.14, p = 0.00$ ), understanding UV

rays cause damage through clouds ( $\chi^2 (93)= 32.09, p=0.00$ ), understanding sunscreen is necessary in all environments and outdoor locations ( $\chi^2 (93)= 17.52, p=0.00$ ), and identifying areas of the body that require sunscreen application ( $t(93)= 3.14, \mu=1.34$ ). The intervention group's results showed significant improvements in attitude by indicating that the implementation of sun safety tips is easy ( $\chi^2 (93) = 28.67, p=0.00$ ) and in developing an aversion for tanned skin ( $\chi^2 (93) = 12.91, p=0.01$ ). Measurement on sunscreen usage could not be analyzed. Objectively measured behavior changes were analyzed using Wilcoxon Signed Rank Tests and showed statistically insignificant results.

*Discussion:* Analysis of pre- to post-test results for the control group on knowledge and attitude related questions did not show significant differences, but the intervention group showed significant increases, indicating that the intervention may have resulted in an increase in knowledge and change in attitude. Results for behavior observations were confounded by prior knowledge, and limited by the environmental design of the outside play area which made it difficult or impossible for participants to access shade, and school policies that prohibited the use of hats and sunglasses prior to arriving at the Boys and Girls Club after school. Findings from this study were shared with the Boys and Girls Clubs of Southern Nevada in order to encourage continued use of the SunWise Program, as repetition is likely to positively impact behavior changes aimed at the prevention of sunburns and increases in sun safety. Continued efforts aimed at prevention are critical, as school aged children have the greatest risk for sunburns because they are outside during peak intensity hours. It is especially important to continue these efforts for youth in Southern Nevada given the increased sun exposure resultant from the desert climate and increased rates of skin cancer experienced in the state.

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## Chapter 1. Introduction

The rise in the number of cases of skin cancer, both fatal melanomas and nonmelanomas, has prompted educational efforts to advise limiting unprotected sun exposure. Skin cancer is highly preventable, so a critical need has emerged to focus on better ways to disseminate information about skin cancer prevention methods. Because 80% of lifetime sun exposure occurs before the age of 18, education of youth is essential. This study, “Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada,” uses the curriculum from the SunWise Program. This standards-based curriculum, created by the United States Environmental Protection Agency (EPA) in 1999, was the first national health and environmental education initiative on increasing sun safety. This curriculum serves as a multifaceted interactive channel for reaching teachers, nurses, parents, and community organizers to raise awareness regarding the importance and necessity for protecting your skin from ultraviolet (UV) light from the sun and educating the youth about sun protection methods.

Working with the Boys and Girls Clubs of Southern Nevada for the study provided an immense benefit to this project. This community based organization provides a safe and nurturing environment for students to attend after school. With the mission of enabling all young people to reach their full potential as productive, caring, and responsible citizens, the Boys and Girls Clubs excel in their responsibility to provide both educational and recreational activities for thousands of children across Clark County, NV (Boys and Girls Club of Southern Nevada, 2016). This organization involves the local community and Clark County businesses by allowing them to partner and volunteer with the club members in many ways, fostering deep connections within the community. The goals of this study align directly with their mission, which enabled the seamless implementation of the SunWise Program.

The population at Boys and Girls Clubs of Southern Nevada reflects a strikingly accurate representation of the population of Clark County in terms of transiency and diversity. Transiency was reported as highest at the Jackie Gaughn clubhouse, as many families either move out of the area or do not attend on a regular basis. Each location reported the amount of Spanish-only speakers as moderate to high. The involved Boys and Girls Clubs included in this study served club members predominantly from Hispanic, Latino, and African American backgrounds. A racial and ethnic breakdown was not conducted for each location, but national statistics show the population consists of 23% Latino members, 28% African American members, and 3% Asian members (Clark, 2014). Together these minority groups comprise over half of the population, and correspond to the demographics of the population in Clark County at 28% Latino, 10% African American, and 8% Asian (U.S. Census Bureau, 2016). Interestingly, these groups reportedly equate darker skin with fewer opportunities, maltreatment, and poverty, a topic heavily discussed through the *preference for whiteness hypothesis* (Painter, 2015). Consequently, minority populations, specifically African Americans and Hispanics, are associated with a lower prevalence of sun protective behaviors, placing them at higher risk for developing sun burns and ultimately skin cancer (Gohara, 2009).

Instead of an ethnic breakdown, intervention locations were matched to control locations based on family size and income level. An important population demographic depends on the age distribution included in the study. Each location accepts club members from 5 to 18 years old, but the age distribution at each location and in total was heavily concentrated in the 7 to 8-year-old age group, and comprised an astounding 58.4% of participants in this study. Young children usually require more

attention when adding unscheduled activities to their normal routine, such as The SunWise Program, Time must be taken to instill new activity procedures to follow, as a younger age group entails more involved group management (Emmer, 1980). This becomes more significant when younger children are placed in supervision of a new figurative teacher away from classroom environment expectations and club directors' supervision. Participants of the study were less inclined to complete the surveys and tasks than they would have been under club management. Surveys were developed by The SunWise Program and contained unfamiliar question formats as well as some misleading language. All collected data for the surveys were from self-reported club member responses.

Many of the activities provided to club members by the Boys and Girls Clubs of Southern Nevada involve outdoor team recreational sports such as basketball and soccer. The members are also allotted a recess break outside, usually after an hour of homework and/or tutoring. These outdoor activities and recess breaks take place at the later end of peak UV hours, from 10am to 4pm, placing club members at high risk of developing sunburns. Observations of participant behavior while outside were noted on whether they take action to follow sun safety tips. The observers noted the total number of participants wearing covered clothing, hats, or sunglasses, and seeking shade to play in during their recess. Each location manages schedules of activities differently based on their needs, thus the recess breaks and recreational activities were held at different times at each observation site.

In this randomized experimental study designed to increase adoption of sun protection behaviors by youth through education, members of participating Boys and

Girls Clubs of Southern Nevada were introduced to information about the dangers of skin cancer, risk of sunburns, and prevention methods for sunburns, using the SunWise Program's toolkit. This toolkit provides lessons, activities, and materials for classroom settings. Following constructs of the Health Belief Model, the goal of this study is to show that participation in the SunWise Program will increase knowledge and improve attitudes of participants concerning sun safety. The Health Belief Model focuses on knowledge and attitudes of individuals, specifically in their perceptions of a certain action's severity, susceptibility, benefits, and barriers, in order to explain behaviors related to health (Janz, 1984). Educating youths on the dangers of sunburns through the SunWise Program was intended to shape their perceived severity and susceptibility. Demonstrating to youths the practicality of avoiding sunburns should build their knowledge of perceived benefits, while the activities involving the participants will eliminate perceived barriers to preventing sunburns. This study aims to measure not only knowledge and attitudes, but also changes in behavior towards becoming more sunsafe.

There were a total of six Boys and Girls Clubs of Southern Nevada locations included in this study, three locations served as control sites and three locations were chosen as intervention sites. Locations were randomly separated into control or intervention sites, where all participants were pretested using the SunWise Program's survey. Participants in the intervention locations were exposed to the SunWise Program to learn about sun safety and the dangers of sunburns through an interactive presentation. Upon completion of the SunWise presentations, participants at both control and intervention locations were again administered the same survey as a



posttest measurement. Their behavior was measured by keeping a log of the usage of the provided sunscreen, and by observing participants playing at recess breaks to mark whether they were wearing covered clothing, hats, or sunglasses, and if they were looking for shade to play under while outside. This intervention included all genders and youth from ages 7 to 18 years old. All ages of youth that attend the Boys and Girls Club were included in this study with the intention of showing that this intervention is successful in increasing knowledge, improving attitudes, and changing behavior at any age, and that the SunWise Program can be easily implemented at every academic or maturity level.

This study builds on previous analyses of the effectiveness of the SunWise Program by improving on the study design that few or no other studies known to the researcher have been able to accomplish. The study was conducted with a randomized population, use of a control group for comparison, randomized selection of locations designated as an intervention or control site, and ability to match individuals' pretests to the posttests. This design provides more internal validity for more reliable results. Additionally, this study measured the effects of the SunWise Program on behavior changes of participants by measuring the application of sunscreen provided and by observing outdoor time for the implementation of sun safety tips.

It was hypothesized that participation in the SunWise program would result in an increase in knowledge related to sun safe behaviors, a change in attitude related to the ability to implement these behaviors and the value placed on tan skin, and an increase in objectively measured sun safe behaviors while participating in outdoor activities.

## Chapter 2. Background and Significance

Skin cancer is a critical public health threat that merits far more attention due to the currently high rates. Incidence rates of melanoma have increased significantly in the United States, increasing by 1.9% every year from 2002 to 2011 (Howlander, 2009). Treatment of nonmelanomas skin cancers increased by nearly 77 percent between 1992 and 2006, while specifically squamous cell carcinoma incidence rates have increased by 200% over the past three decades (Karia, 2012). Rates of fatal melanomas in Nevada are higher than the national average, with about 3.2 fatalities per 100,000 people (CDC, 2011), compared to 2.9 per 100,000 people in the United States in 2009 (CDC, 2011). Skin is the largest organ in the body and serves as a protective barrier to internal tissues from exposure to radiation, temperature extremes, toxins and bacteria, while providing sensory perception, thermoregulation, and immunologic surveillance, a theory that the immune system patrols the body to recognize and destroy invading pathogens and removes malignant cells (The American Heritage Medical Dictionary, 2007). Skin is an essential organ serving many necessary functions, and as such we must work to protect it. Sunburns are defined as damage to superficial and deep layers of skin cells from UV radiation, and are the prime risk factor for developing skin cancer (CDC, 2013).

Many people are unaware of how common skin cancer is and more importantly, how it is so easily preventable. The American Cancer Society states that skin cancer is the most commonly diagnosed cancer in the United States (Rogers, 2010), while the Centers for Disease Control and Prevention (CDC) and the American Cancer Society both state that skin cancer is more common than lung cancer, prostate cancer, and

breast cancer combined (American Cancer Society, 2009; CDC, 2011). Over 3.5 million people are diagnosed with skin cancer each year in the United States alone (Rogers, 2010). Skin cancer occurs most commonly in the following three forms, basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. Basal cell carcinoma and squamous cell carcinoma are usually treatable forms of skin cancer, although treatment can be high in cost. These two forms are highly curable by surgical removal, especially when diagnosed and treated early. Malignant melanoma is the most dangerous and fatal form of skin cancer, reportedly killing one person every 57 minutes in the United States (American Cancer Society 2013).

The southern Nevada desert climate has an abundance of high intensity, direct sunlight with little to no natural protection from harmful UV rays. Southern Nevada experiences over 250 days of sunshine a year, which could explain why skin cancer rates are higher than the national average. About 68 Nevadans die of malignant melanoma every year, and this mortality rate is tripled for men compared to women (Robinson, 2005). However, the most common forms of skin cancer, squamous cell carcinoma and basal cell carcinoma, are not required to be reported to state registries. These two forms grow slowly, and rarely metastasize or spread to other parts of the body, and can be successfully controlled with medical interventions (Morgan, Kyra, 2012). If these forms were included in the reporting, the rate of skin cancer in Nevada would be even higher. Death caused by malignant melanoma is the only cancer incidence rate which has continued to rise throughout the country at about 1.9 percent annually from 2000 to 2009, demonstrating the need for interventions to decrease melanoma in the United States, but especially in Nevada (Howlander, 2009).

The prevailing aversion toward tanned skin in the target population seems to be in opposition to the widely held view that Americans luxuriate in damaging their skin through tanning by the sun or tanning booths, as over 38 million Americans engage in just indoor tanning (Szabo, 2014). Tanning skin in order to adhere to a common beauty standard is actually an unpopular concept in the minority heavy target population, as non-white races do not view darker skin as a beauty trait. However, these minority groups are not using sun safe behaviors to protect their skin from sun damage. A 2009 analysis found that over 63% of African Americans never use sunscreen or engage in skin protective behaviors (Pichon, 2010). A study using data from The National Health Interview Survey found that 47.1% of Hispanic adults rarely or never use sunscreen (Coups, 2012). An underlying cause may be that minority groups are under a false impression of having a lower perceived risk in developing sunburns and skin cancer due to the natural protection from darker skin. As discussed in the Health Belief Model, perceived risk of a disease determines health behaviors to avoid a disease. The notion that higher amounts of melanin in the skin is protective creates a lower perceived risk in minority groups. This has led to a widely held misconception that their natural skin pigment will be enough to completely protect them from developing sunburns. The danger of this lower perceived risk is shown in the disparity among minority mortality rates from skin cancer. A 2001 study found that 58.8% of African American patients diagnosed with melanomas survived, while 84.8% of Caucasian patients survive this skin cancer (Bellows, 2001). Similarly, a 16-year cancer registry was analyzed and found that more than double the amount of Hispanic patients had a melanoma of 2 mm thickness compared to Caucasian patients (Rouhani, 2008). This disparity is in part due

to minority groups being diagnosed at much later stages of skin cancer than their Caucasian counterparts. Additionally, this may stem from misconceptions shaping their knowledge of sun safety, lack of sun safe behavior, and misadvised attitudes toward sun safety.

This increase in skin cancer incidence rates could be avoided, as there are simple, quick, and easy steps to prevent skin cancer. These steps include: wearing covered clothing, wide brim hats, and sunglasses, applying the appropriate sunscreen to exposed skin, and seeking shade while outdoors. Because many people are not aware of how common or lethal skin cancer is, they do not diligently implement these strategies to reduce sunburns (Karen, 2012). The southern Nevada desert sun emits high intensity ultraviolet (UV) radiation, exemplifying the need for increased prevention measures. Nevada's sunburn incidence is higher than the national average with 38.3% of non-Hispanic white adults reporting serious sunburns in 2004 compared to 33.7% of non-Hispanic white adults reporting sunburns (BRFSS, 2004).

Sunburns acquired in youth are the primary risk factor for skin cancer later in life (Zanetti, 1992). However, children have the greatest risk for sunburns because they are outside in the sun during peak intensity hours. Children in school are in direct sunlight during physical education classes, recess, and walking to and from school between the hours of 10am to 4pm. During these hours the UV index is high to very high, with the potential to cause harm to exposed and unprotected skin within one half hour of exposure. This significantly increases the risk for sunburn, and thus the potential to develop skin cancer (Robinson, 2005). Individuals between the ages of 10 to 20 years have a melanoma rate nine times the national average (Kyle, 2008). Diagnosis and

treatment of 40 percent of childhood cases are delayed, which could result in a worse prognosis (Ferrari, 2005). Since children are at an increased risk for developing sunburns that lead to skin cancer, more attention is needed for interventions focusing on sunburn prevention. This intervention aimed to increase education and change behavior and attitudes related to sun safe behaviors by educating youths aged 7 to 18 years old. The ultimate goal is to reduce the prevalence of sunburns and potentially decrease future rates of skin cancer for Southern Nevada youth.

The Environmental Protection Agency (EPA) has developed an age appropriate and informative presentation, entitled the SunWise Program, to educate children about the risks of sunburns and how to prevent them. This program has been proven successful in changing behaviors to prevent sunburns based on self-reported data and increasing knowledge in how to prevent sunburns in schools that have implemented the program (International Agency for Research on Cancer, 2002). Studies have shown that the SunWise Program increases knowledge about sunburns, improves attitudes toward applying prevention methods in daily life, and results in modest behavior changes toward implementing sun safety practices. Based on these findings, it is projected that this program has led to the prevention of over 11,000 new cases of skin cancer in the United States (Kyle, 2008). This intervention measured changes in the behaviors, attitudes, and knowledge related to sun safe behavior of 228 youths at six different Boys and Girls Clubs of Southern Nevada in Clark County, NV. Three of these clubs served as control sites, while three locations were randomly selected to serve as intervention sites. Educating club members about recognizing sunburns, understanding their dangers, and how to easily prevent them in a 20-minute presentation, has shown to

have enabled these youths to protect themselves from this skin cancer risk factor when outside.

Participants were taught prevention methods endorsed by the Environmental Protection Agency, the American Cancer Society, and the Centers for Disease Control and Prevention. Participants were taught to wear protective hats, covered clothing, sunglasses, seek shade, and most importantly, the proper ways to use sun screen. This intervention measured knowledge related to sunburns, prevention methods, and attitudes toward sun safe behaviors by administering a pretest and posttest before and after a 20-minute lesson from the SunWise Program. Use of provided sun screen was monitored to determine the amount of sun screen the children used prior to and after the intervention. Additionally, outside behavior was observed to determine how effective the intervention was at changing behavior. This study determined changes in sunsafe behaviors through observation of outdoor behaviors during recess two days a week for 2 weeks before and 2 weeks after the presentation.

The presentation is separated into age appropriate lessons. The lesson for younger children explains the positive and negative aspects of being exposed to the Sun's UV rays, such as feeling warmth, supporting life functions of growth, and damaging the skin, as well as simple ways to avoid developing sunburns. The lesson discusses how to use the UV index and understanding sunscreen bottle labels. The SunWise Program's lesson geared toward older children from 10 years and older, builds on the one for younger children of ages 7 to 9 years old, by including additional topics such as the importance of the Ozone layer and addresses the need to change the perception of tanning to connote "damaged skin". Each age appropriate lesson consists

of a PowerPoint presentation accompanied by over a dozen different hands on activities to engage the participants, such as a race to wear the proper attire in order to be SunWise, a color changing Frisbee to test the effectiveness of different sunscreens, and shadow measurements to determine the time of day when being SunWise is most important.

Many programs are available to educate youths about the importance of sun safety. The Los Angeles Metropolitan Dermatological Society (LAMDS) developed the program, “Sun Safety for Kids” on the importance of sun protection and how to protect oneself from the sun (LAMDS, 2009). However, this program requires more efforts from the teachers or community leaders who may be administrating the program to develop educational tools, such as PowerPoints or activity sheets, to teach the participants. The Sun Safety for Kids nonprofit corporation provides valuable information on sun safety, but the only tools available are videos for purchase. This non-profit, as stated earlier, has been developed by dermatologists, which may skew perception of the corporation by prospective users of the program due to potential for a funding or sponsorship bias. Klein-Buendel, INC. developed the “Sunny Days Healthy Ways” curriculum for Kindergarten through 5<sup>th</sup> grade, but materials for this program are only available through purchase from their website (Klein, 2006).

Another possible curriculum choice is the Sun Safety Alliance, which lists information on how to teach youth the importance of staying safe in the sun, as well as the simple methods to keep skin safe in the sun (Hendricks, 2009). Their resources include portable document format (PDF) informational sheets of how to implement sun safety education in the classroom, and their website lists further resources including the



SunWise Program to help guide sun safety education, but educational tools for easy use of the Sun Safety Alliance program are not available. The Norris Cotton Cancer Center (NCCC) also developed a practice manual to be used for sun safety education, but only provides ideas for activities along with the information to disseminate (Dietrich, 2006). The language used in this curriculum included a test sheet and PDF's, but requires more effort from teachers and community leaders to develop educational tools.

The SunWise program has the most comprehensive curriculum of all researched options. This program includes mixed media educational tools such as videos, fliers, posters, PowerPoints, and numerous activities for grades from Kindergarten to 8<sup>th</sup> grade. The PowerPoints contain grade-level appropriate information developed for different age groups, and are easy to implement into any setting. The SunWise program provides a completely free toolkit, which also includes physical resources, such as a UV color changing Frisbee and UV color changing beads, as positive reinforcement and visual aids during the lesson. The toolkit contains a guide to program implementation, fact sheets regarding skin cancer, sunburns, and prevalence of both in a map of the United States of America. The curriculum is built to have the most practical use in classrooms as it meets various science and social science standards, allowing easy implementation by teachers. To maximize benefits of the toolkit, the SunWise Program provides the pretest and posttest measurement tool for possible use as a science grade for students. The language is clear and is meant to be easy for students of all ages to understand, the lessons are short with a multitude of tools already created, and the program is completely free.

Findings from this study have shown the SunWise Program to be effective at significantly increasing knowledge of sunburns and sunsafe behaviors. While findings did not support the SunWise Program's ability to increase objectively measured behaviors, increasing knowledge is a critical component of behavior change. It is recommended that future research incorporate additional lessons and skill building related to sunsafe behaviors and conduct observations in a more controlled environment. Given the rising rate of melanoma and increased risk related to abundant sun exposure in Nevada, interventions aimed at increasing sunsafe behavior in youth are critical. Further research is warranted related to the translation of sunsafe knowledge to behavior change in youth. This intervention has shown that engaging youth in the hands on activities built self-efficacy in participants to be able to engage in sunsafe behaviors. The community impact that was triggered through the engagement of various organizations to support sunburn prevention and sun safe behavior has been inspiring. The implementation of the SunWise intervention at participating Boys and Girls Club locations has increased awareness among youth and the community about the importance of sun safe behaviors.

## Chapter 3. Literature Review

Healthy People 2010 (HP 2010) set a target of decreasing the melanoma death rate from the baseline level of 2.6 deaths per 100,000 population to 2.3 deaths. However, it was reported in the HP2010 Final Review that this target was not met, and in fact, death rates had increased 3.8% to 2.7 deaths per 100,000 population. An additional, albeit modest, HP2010 target was set to increase the percentage of students (grades 9-12) who use sun protective measures from 24% to 28%. This target was also not met and the percent change was insignificant from baseline levels to the final report. Healthy People 2020 (HP2020) have again included melanoma and unsafe behaviors in their objectives for the next decade. HP2020 aims for a 10% decline in melanoma deaths to 2.4 deaths per 100,000 population by the year 2020. New objectives related to unsafe behaviors have been added and they include the following: Reduce the proportion of adults aged 18 years and older who report sunburn from baseline 37.5% to 33.8%; Reduce the proportion of adolescents in grades 9 through 12 who report using artificial sources of ultraviolet light for tanning from baseline 15.6% to 14%; Reduce the proportion of adults aged 18 and older who report using artificial sources of ultraviolet light for tanning from baseline 5.6% to 3.6%; Increase the proportion of adolescents in grades 9 through 12 who follow protective measures that may reduce the risk of skin cancer from baseline 9.3% to 11.2%; and Increase the proportion of adults aged 18 years and older who follow protective measures that may reduce the risk of skin cancer from baseline 67% to 73.7%. One objective to reduce the proportion of adolescents in grades 9 through 12 who report sunburn is still listed as developmental and contains no baseline or target.

Saraiya, Hall, & Uhler (2002), used national Behavioral Risk Factor Surveillance System (BRFSS) data from all 50 states and Puerto Rico to establish population-based estimates of sunburns among United States adults over the age of 18 years. The authors noted a rapid increase in melanomas in the United States from 1973 to 1998, jumping over 150% from 5.7 cases per 100,000 persons to 14.3 cases per 100,000 persons (Saraiya, Hall & Uhler, 2002). Additionally, in 2001, data showed over 1.3 million cases of basal cell and squamous cell carcinoma, making skin cancer the most common cancer in the United States. The cause of this jump in incidence of a preventable cancer is due to more unprotected exposure to ultraviolet (UV) radiation. Repeated UV exposure is the key cause for developing melanoma and basal cell carcinoma. A sunburn is defined as the “cutaneous reaction to an acute overexposure to UV radiation” and regardless of the age at which one develops a sunburn, they are associated with a greater risk of developing melanoma or basal cell carcinoma (Saraiya, Hall & Uhler, 2002).

The 1999 BRFSS asked respondents to recall whether their skin had been red for more than 12 hours and how many 12 hour sunburns they have had in the past year. The collected answers were sent to the Centers for Disease Control and Prevention (CDC) for data analysis. Saraiya Hall & Uhler (2002) used UV index scores calculated by the National Weather Service and calculated state averages to create a measure of expected risk of overexposure to UV from the sun. The average UV index of each state was matched with the respondent from their state and their number of sunburns, race, and 95% confidence intervals. This created three crude risk-level groups of low,

medium, and high and then adjusted by age, ethnicity, or both to compare demographics and health characteristics associated with sunburns in white adults.

Data from the 1999 BRFSS showed that recent sunburns were reported most often by white non-Hispanic males and females, with a total of 31.7% of 156,354 adults reporting at least one sunburn in the past year. When compared by age groups, 57.5% of adults between the ages of 18-29 reported at least one sunburn, while only 7% of the oldest adults reported at least one sunburn. Males (42%) reported being sunburned more frequently than females (30%), and non-Hispanics (40%) reported sunburns more frequently than Hispanics (20%). Individuals who have graduated college and individuals making an income of over \$50,000 reported the highest number of sunburns. Summarized in color coded map of the United States, UV index averages for major cities were calculated. Nevada was ranked in the group with the highest UV index averages and also reporting the highest number of sunburns. Residents in Nevada reported an average of 6 sunburns within the past 12 months, as well as reporting at least one sunburn in over 40% of cases. Comparatively, Arizona, also ranked in the group with the highest UV averages, and displayed less than 30% of residents reporting having any sunburns within the last 12 months (Saraiya, 2002).

About one third of adults in 1999 in the United States reported being sunburned one or more times in the last 12 months (BRFSS, 1999). There is a significant association among white people identified with higher education, higher income, being employed or being a student, and having more children with reporting more sunburns. One potential explanation for this finding, is that more leisure time opportunities have been associated with increased risk of developing sunburns (Purdue, 2002). This study

also found a significant proportion of blacks, Asians, and American Indians/Alaskan Natives who reported sunburns and the authors conclude that these ethnic groups would also benefit from sun protection.

The target population at the Boys and Girls Clubs of Southern Nevada included in this study will fall in varying racial and ethnic categories. These groups still report significant sunburns and while club members play outside on a consistent basis in different sports tournaments, education on sun protection is necessary to avoid this risk factor for melanoma.

Unprotected sun exposure during childhood has been found to serve as important biological and epidemiologic periods, due to the long latency period from exposure leading to developing melanoma (Robinson, 1997; Shoveller, 1998; Hill, 1992; Hoegh, 1999) and warrant higher attention on sunburn prevention among youth. Nevada is one of the four states reporting the highest age-adjusted melanoma mortality rates for males, as well as the highest self-reported sunburn rates among whites adjusted for age and ethnicity. Nevada, along with the three other states in this age-adjusted category for reporting high sunburn and melanoma mortality rates, should focus on improving sun-safe behaviors and increase efforts targeted at this behavior change. Australia has had success with a skin cancer prevention program, Sun Smart, which reported a decrease in sunburn prevalence from 11% to 7% over a three-year period. This program was implemented through mass media campaigns and principally through schools (Montague, 2001). The United States should conduct more studies on monitoring sunburn rates and protective behaviors by state to measure any successes in skin cancer prevention as outlined by goals in Healthy People 2020.

An article released by the journal, *Pediatrics*, in 2008 entitled, "Economic Evaluation of the US Environmental Protection Agency's SunWise Program: Sun Protection Education for Young Children evaluated the effectiveness, and the equally important component of cost-benefits of the SunWise Program. This was used to teach students in middle and elementary schools how to prevent overexposure from the sun and why this effort is important. The materials, lessons, and activities used in the SunWise curriculum were reviewed by a panel of educators, curriculum specialists, and skin cancer researchers to approve the content in terms of scientific accuracy, national education standards, and age-appropriate information (Kyle et al, 2008).

The SunWise Program was used in over 15,000 schools in the United States from 1999 to 2007 and included all ages. The curriculum was evaluated using standard cost-benefit analysis methods based on comparing costs (averted direct medical costs, and costs of productivity loss) and health outcomes (skin cancer cases, premature mortalities averted, and quality adjusted life years [QALYs]) compared to a no intervention alternative. Methods for evaluating the success of the program included pretests, educational and interactive presentations, followed by posttests with each step administered in two month increments. The study was conducted completely anonymously so no identifying information was taken from the students. This did not allow for case matching of pretests and posttests, therefore results relied on over all percentage of students providing responses (Kyle, 2008).

Different funding scenarios were studied every two years with the same methods used in every case involving pretest and posttest surveys to students, behavior change modeling, and modeling lifetime UV exposure into a number of averted skin cancer

cases using the EPA's Atmospheric and Health Effects Framework (AHEF). This was accomplished by using statistics on outdoor activities based on the season, gender, and geographic region and potential UV exposure at those times. In order to model behavior changes, the surveys included questions on behaviors in terms of wearing a hat, long-sleeved shirt, sunglasses, or sunscreen and students reported themselves as implementing these behaviors "All the Time," "Sometimes," or "Never". These behaviors were organized by UV protection factors and were also used as a way to measure reductions in UV exposures at the posttest. This study also attempted to create estimates of the medical and productivity cost averted per skin cancer case, premature mortality prevented, estimates of QALYs saved, and a calculation of the net benefit of SunWise (Kyle et. al, 2008).

The results indicated that the greatest improvement between pretests and posttests were in the change in knowledge variables, varied change in student attitudes and practices, and in predicted behaviors. Predicted behavior was analyzed by developing models of average behaviors which keep skin safe in the sun based on national statistics on frequency of these behaviors. The economic analysis projected that if current funding levels, compared to two other funding categories developed by the study, continued until 2015, more than 50 premature deaths, and almost 11,000 skin cancer cases in SunWise participants could be avoided. A difficulty was noticed in reporting costs that took place in the home for purchasing sunscreen and full brimmed hats.

These authors concluded the SunWise Program causes significant reductions in risk for developing skin cancer, and that even modest behavioral changes produce cost-



effective results. This sun safety education program was determined to be a worthwhile endeavor in terms of impact and economic cost-effectiveness. The cost-effectiveness of the SunWise program was compared to other studies examining the relationship of two other preventative behavior interventions in terms of their success and budget. These comparative interventions were on preventing sexually transmitted diseases and unintended pregnancy, a reduction of a ratio of 2.65, and programs aimed at reducing obesity rates saw a reduction ratio of 1.2. SunWise has been most beneficial with a reduction ratio between 2 and 4 times higher. Pediatricians may use this study to communicate the risk of sun exposure to patients and their families. The research community can use this research method to conduct more assessments of student risk behaviors, and at what cost, which is an important consideration for school systems which are consistently underfunded. School administrators should use this as evidence to implement the SunWise Program in their schools, as the cost is minimal and the time commitment to the lessons is about two hours (Kyle et al, 2008).

Another helpful article, "Evaluation of the SunWise School Program" by Alan Geller et al was published in 2003 in *The Journal of School Nursing* and analyzes the effects and impact of the national program set in place by the Environmental Protection Agency to reduce incidence of skin cancer. The authors cite how prolonged unprotected childhood exposure to ultraviolet (UV) light increases a person's risk for developing skin cancer later on in life. This increased risk is being countered by SunWise, the first national environmental and health education program for sun safety of children in primary and secondary schools, ages 7 to 18 years old. The study states its purpose as presenting the effects on students' knowledge, attitudes, and practices after going

through the SunWise Program. Using pretests and posttests in 85 schools across 35 states, this study evaluated the program and concluded that significant increases in knowledge were found. The current study also used the same pretests and posttest surveys for program assessment.

Geller begins by presenting sources of information on how influential building habits at a young age are instrumental in changing behavior, how schools are the most appropriate setting to campaign for sun safety behavior implementation, explaining the need for communicating the risks associated with sunburns, and the positive effects of sun protection (Geller, 2003). One study cited in this study states that skin cancer incidence can be lowered by almost 80% through regular use of sunscreen. Other studies discussed in this article explain how multiunit presentations have much better and longer lasting effects on attitude and behavior than a single one hour or shorter presentation. Primary schools and preschool studies in France and Canada using multiunit presentations have found large increases in student comprehension of the sun, skin damage, and using sun safety skills.

Self-administered identical pretests and posttests were sent to schools before and immediately after the SunWise School Program in 1999, 2000, and 2001 in a randomly selected 85 schools from a total of 455 SunWise participating schools. A majority of respondents were between 5 years old and 13 years old. Response rates were over 95%, and evaluation did not require a parental consent form or child assent form by the Boston Medical Center Institutional Review Board as the survey form did not contain any personal identifiers. The data obtained from these participating schools was compared to a control school district in Framingham, Massachusetts, which did not

receive any SunWise intervention. In all of these schools, school nurses were asked to provide two follow up surveys in the next spring and fall as the students progressed through grade levels to determine if they maintained the acquired knowledge, healthy attitudes, changes in sun protection behavior, and changes in rates of sunburns (Geller, 2003).

The same survey was used in every school for every year this study was conducted. The survey contained questions on demographics (age, sex, hair color); knowledge (appropriate SPF for outdoor play, highest UV Index number needed for sun protection, need for hats and shirts outside); attitudes (whether a suntan is good for the skin); practices (sun-screen use and use of hats, long-sleeved shirts, and sunglasses); and intended practices (sunscreen use and playing in shade for the upcoming summer). One question asked children to report the number of sunburns experienced the previous summer, and intended practices was chosen as an outcome measure because SunWise lessons taught in the spring did not provide enough of an opportunity to students to actually implement behavior. This study by Alan et al. (2003) did not use unique identifiers for the participants and was not able compare changes of individual answers. The results of the current study can improve upon Alan's study due to the ability to determine individual changes in survey responses due to a matched pre- and post-test, although the current study has a much smaller sample size and shorter time frame.

Results from Allen et al. (2003) showed that sixty-two percent of children reported that they had received a sunburn during the previous summer, with sunburn rates of 59% in the youngest children (ages 5–9) and 63% in the oldest children (10–12

years). They also found that sun screen was only consistently applied to 26% of students and this rate decreases with age. Marked improvement was noted for all three knowledge variables in the benefits of wearing a hat and covered shirt, correct SPF usage, and understanding the UV index. Youngest children were most likely to report a change in attitudes in understanding that suntans were not good for their skin. Overall practices did not change significantly, but intended practices increased somewhat. Control schools had student attitudes toward associating tan skin with healthy skin rose, while knowledge and behavior remained static. The authors concluded that the SunWise program led to substantial increases in student knowledge and modest changes in attitudes or behavior. The authors have labeled this a social-marketing and public health challenge that should be addressed urgently. They posit that school settings are the most appropriate settings to educate youth about the dangers of sunburns, but for a more substantial impact this program will have to be paired with community wide support and mass media campaigns.

Future studies are necessary to improve the quality of evidence related to the SunWise Program, as much of the data has been self-reported information, and in the collective impact of other SunWise programs in the community settings along with the school program. This program has shown that small behavioral changes may result in significant reduction in skin cancer incidence as well as outweigh the small, usually unreported, costs of program implementation. The current study, "Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada" added to the literature by enabling the ability to match pretests with posttests and provide more reliable data on changes in knowledge and attitude.

This study also measured sunsafe behaviors objectively, rather than relying on self-reported data. Previous studies were also carried out over the course of a year, resulting in a large loss to follow-up. This study did not have a large loss of data, receiving nearly 90% of the posttests from participants who completed pretests.

## Chapter 4. Methods

### Research Design

This study aimed to increase knowledge and attitudes of sun safety practices and to increase sunsafe behaviors in Clark County's youth by focusing on preventing the main risk factor for developing skin cancer, sun burns. This randomized quasi-experimental study was based on the Health Belief Model, and used a control group to compare to the intervention group from a randomly selected population. By randomly assigning 3 locations as intervention sites and 3 locations as control sites, the study spent three weeks assessing the impact of The SunWise Program. Each location was pretested to create a baseline understanding of sun safety, while also measuring sunscreen usage and observing sun safe behaviors while outside. The interventions sites participated in The SunWise program to learn how and why to be sunsafe, and subsequently posttested with the same survey to determine increases in knowledge and changes in attitude. All 6 locations were also observed for the implementation of sunsafe behaviors while outdoors. Pretests and Posttests were matched using unique identifiers randomly assigned to each participant.

The Health Belief Model states that a person will follow a prescribed action if they believe this action will aid them in avoiding an adverse health condition, believe the adverse health condition is preventable, and believe that they are able to follow the prescribed action. Applied to this intervention, participants were taught to understand that sunburns can be avoided through the use of proper clothing, seeking shade, and applying sunblock. Through educational lessons, study participants gained the self-efficacy to apply these sunsafe behaviors, to wear sunsafe clothing, find shaded areas,

and apply sunblock. Teaching youth about how to stay safe in the sun potentially builds better habits to actively avoid sunburns, aiding in the prevention of skin cancer in the future. The main goal in this intervention was to increase understanding about the necessity of being safe in the sun while increasing sun safe behaviors.

The graduate student working under the principal investigator of the study, Dr. Coughenour, taught the SunWise Program's lesson in three different Boys and Girls Clubs to all age groups from 7 to 18 years old. Observations of outdoor behavior were conducted to measure whether participants were engaging in sunsafe behavior before and after the intervention with the assistance of 13 CITI certified volunteers. The graduate student administered pretests and posttests, as well as analyzed the data obtained from these tests. Sunscreen, which was provided at each participating location, was intended to be used to measure the amount of participant usage before and after the SunWise Program's lesson.

## Recruitment

The Boys and Girls Club of Southern Nevada comprises of a wide range of backgrounds to allow an excellent mix of ethnicities and socioeconomic statuses that should permit generalizability to the Clark County population. Repeating this study in multiple club locations with consistent results should yield strong validity. Each club was provided with identical bottles of sunscreen and received the same lesson from the SunWise Program by the Environmental Protection Agency's SunWise, standardizing the study so it was conducted nearly identically with each age group at every location. This analysis is limited to parents that permit their child to take part in the SunWise Program, and limited to locations available to participate and actively cooperate in this

study. Three club locations served as the intervention sites, and three other club locations served as a control site receiving no intervention.

Boys and Girls Club locations all over Clark County, NV were contacted by phone to elicit interest in participating in this study. Location managers were very eager to include an educational program geared toward building habits of sunscreen usage for their club members. Each phone call was followed with an email containing further information in the form of a Letter of Intent of how the study will progress, a summative flyer of activities involved (see Appendix A), and then a meeting with the site manager to discuss logistics. All eight locations had shown interest and completed the UNLV Facility Authorization Forms. The Chief Operating Officer of the Boys and Girls Clubs of Southern Nevada conferred with the graduate student in order to give consent to involve these clubs in the project and narrow down locations to six clubs based on the best availability to participate in the provided time frame. This resulted in the final six locations that took part in the intervention.

Efforts were made to sample in geographically different regions of the Las Vegas area and to match intervention and control locations based on the Title I status of the schools closest to each participating club, choosing both high and low income areas of Las Vegas. Staff at each club location were asked to submit the names of the schools from which the majority of their club members come from each day as the population at these schools best reflected the members of their clubs. These schools were located within one mile of the club location, allowing the club members to walk from school to their nearest club, while the remaining club members are shuttled from the schools that are located too far away to walk. Title I status is determined from the percentage of



students whom are dependent on the Clark County School District’s Free and Reduced Lunch Program (FRPL) based on family income and number of dependents in each home. A school is considered to be Title I when over 50% of youth qualify for this program. Eligibility to participate in this program is determined based on annual income between 130%and 185%of the federal poverty level and family size. As of June 2014, a family of four with an annual income level at \$30,615 fell within 130% of the federal poverty level, and the same family size at \$43,568 fell within 185% of the federal poverty level, qualifying the family for the program. Applications must be submitted annually, resulting in a current reflection of the percentage of the student population belonging to a lower income family. Data on FRPL percentages were obtained through the Clark County School District’s annual report from 2014 to 2015 (Clark County School District, 2015). Table 1 displays the average percentages of each location and how they were matched to determine the control and intervention sites.

*Table 1. Boys and Girls Club Location Matching Summary, Randomized Control versus Intervention Sites Matched Based on Average Percentage of Free and Reduced Price Lunch Participants Based on Surrounding Schools in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

<b>Intervention Locations</b>	<b>Average FRDL%</b>	<b>Control Locations</b>	<b>Average FRDL%</b>
James	66.2%	Donald W. Reynolds	35.8%
John C. Kish	71.3%	Downtown	74.1%
Jackie Gaughan	87.9%	Lied Memorial	85.6%
FRDL% = % of students who qualify for the free and reduced price meal program			

## Participants

Participants of this study consisted of club members aged 7 to 18 years old from the six participating Boys and Girls Clubs of Southern Nevada. Tables were set up in the lobby of each club that contained information on the study and displayed the

sunscreen that would be used. Parental consent was obtained by tabling during parental pick up at the end of the day. Parents were able to ask any questions and provide consent for their child to participate in the study by completing the parental consent form (see Appendix B). Information packets describing the purpose and nature of this randomized quasi-experimental study along with parent consent form copies were distributed with each club member in English and Spanish, as these are the two most common languages spoken in Clark County. All consent forms contained contact information for the graduate student and principle investigator in the event that parents had more questions related to the study. It also contained contact information for the Office of Research Integrity in the event that parents or participants felt uncomfortable for any reason related to the study. Parents were able to refuse signing the form, denying permission for their child to be a part of the study.

Child assent was attained by meeting with the club members in their pre-set age groups at each location. The graduate student explained the purpose, significance, and methods of the study, then went through the child assent form orally (see Appendix C). All questions were answered and forms were provided in English and Spanish, depending on which language the child felt more comfortable reading. If the child was interested in participating in the study, they signed and returned the form to the graduate student. These forms were matched with parent permission forms that had already been collected and are being stored in the principal investigator's office for the required years and will then be subsequently shredded. Table 2 summarizes the total number of participants from each club location.

*Table 2. Total Participants from Each Location & Percentage of the Total Population Comprising Each Location Participating in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

<b>Intervention Locations</b>	<b>Participants</b>	<b>% of BG total population</b>	<b>Control Locations</b>	<b>Participants</b>	<b>% of BG total population</b>
James	30	13.0 %	Donald W. Reynolds	42	18.2 %
John C. Kish	35	15.2 %	Downtown	30	13.0 %
Jackie Gaughan	29	12.6 %	Lied Memorial	62	26.8 %
Intervention Total	94	41.2 %	Control Total	134	58.8 %
Total participants	228	BG=Boys and Girls Club of Southern Nevada			

## Measurement

### Change in Knowledge, Attitudes, and Self-Reported Behavior

Variables that were measured include gain in knowledge, change in attitude and implementation of sun safety behaviors. Knowledge changes from the SunWise Program concerning severity of skin cancer, dangers of sunburns, examples of simple methods to avoid sunburns, attitudes toward implementing sunsafe practices, and comprehension of sunscreen use were measured using pretest and posttest results. Age ranges of the club members were recorded at the time of the pretest and posttest administration, and at the sunscreen usage measurement. This study did not collect data on adults.

The SunWise Program used a PowerPoint Presentation as part of the interactive intervention to increase knowledge and attitude (see Appendix D). The measurement tools, as well as the presentation, were developed and shared by Environmental Protection Agency's SunWise Program. The pretest and posttest contain the same questions in the same format for all participants (see Appendix E). The question types include multiple choice formats, choosing a response out of a range on a Likert scale, true or false, and answering yes or no. The lesson from the SunWise Program was

preceded by four outdoor behavior observations at each of the three intervention sites. The lesson was followed by a posttest and four additional outdoor observations. Questions were read aloud to each group by the graduate student to ensure comprehension and completion of each question. This process took about 20 minutes per group and was repeated at all six locations

The posttests were matched to the pretests using unique identifiers assigned to each participant as they were handed a pretest and collected in order of completion. The assigned unique identifiers were given in a list to the site director to gather participants during each observation and lesson. The use of three control schools not receiving the SunWise Program's lessons provided stronger reliability of results. Control sites also had a total of 8 outdoor behavior observations followed by a posttest. At the request of the control site, the graduate student returned after administering the posttest and conducting the 8th outdoor observation to present the information to their club members, affording them the benefit of this important knowledge gained from the SunWise Program.

#### Change in Objectively Measured Behavior

A change in the implementation of sunsafe behaviors was measured objectively through observations of the subjects in the playground areas during outdoor activities before and after the intervention. Observers used systematic observation to record the number of children demonstrating sun safe behaviors. The measurement sheet was developed by the graduate student to allow for quick tallies in spacious boxes labeled "Sunglasses," "Hats & Covered Clothing," and "Shade." (see Appendix F). Totals from each observation were recorded and are displayed in the results section in Table 8.

The observation method used in this study mimics the observation technique used in the System for Observing Play and Leisure Time Activity in Youth (SOPLAY) protocol, which is used to monitor child activity levels at school. Observations are “based on momentary time sampling techniques in which systematic and periodic scans of individuals and contextual factors within pre-determined target areas are made” (McKenzie, 2006). Target areas were predefined and broken into sizes manageable for one observer to record sunsafe behaviors. Target areas varied by location, but included recreation areas outside such as basketball courts, play grounds, garden areas, and open fields.

Volunteers aiding in observations were taught how to visually divide their assigned club’s recreational area into the manageable sections already decided upon by the graduate student. This allowed for consistency in how to observe participants moving through the entire recreational areas. Volunteers were trained to remain standing in one position and scan the area north to south and east to west while marking observations for the entirety of the 20-minute recess. These behaviors were marked in the observation worksheet categorized into different behaviors including wearing sunglasses, covered clothing, hats, and finding shade. The only behavior that had to be monitored continuously was whether participants would seek shade and the observer marked this behavior once for each participant playing in shaded areas. The use of sunglasses and hats and covered clothing remained a constant for each child throughout the entire time outdoors, thus, observers recorded the application of this behavior only once for each participant.

The schedule of pretests, posttests, presentations, behavior observations took place over the course of one month. Figure 1 displays a summary of the schedule by each Boys and Girls Club location, a larger version is also available in the Appendix (Appendix G). A pink color represents pretesting while a purple color represents posttesting. At the intervention sites, which are labeled in the figure as well as highlighted in an orange color, the lesson from the SunWise Program was administered before the posttest. All participants that had not yet participated in the lesson from the SunWise Program were marked off of a list of total participants, and were not included in behavior observations following the posttest at the intervention locations. At the control sites, the lesson from the SunWise Program was administered after the posttests were collected. All participants that had already participated in the lesson from the SunWise Program were marked off of a list of total participants, and were not included in behavior observations following the posttest at the control locations. A larger figure is also included in the appendices for easier viewing.

*Figure 1. Schedule of the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada from Pretest, Observations, Interventions, and Posttests at Both Intervention and Control Locations*

Locations	Pretests and Observations								Posttests at Intervention Sites and Observations								Remaining Pretests, Posttests, and Observations							
	Fri 4/1	Mon 4/4	Tue 4/5	Wed 4/6	Thu 4/7	Fri 4/8	Mon 4/11	Tue 4/12	Wed 4/13	Thu 4/14	Fri 4/15	Mon 4/18	Tue 4/19	Wed 4/20	Thu 4/21	Fri 4/22	Mon 4/25	Tue 4/26	Wed 4/27	Thu 4/28	Fri 4/29	Mon 5/02	Tue 5/03	
920 Cottage Grove Ave (Intervention)	Pretest Obs 1			Obs 2		Obs 3	Pretest + Obs 4	PresPost Obs 5				PresPost Obs 6	Obs 7						Obs 8					
2530 E. Carey Ave (Intervention)	Pretest				Obs 1		Obs 2	Obs 3	Obs 4	PresPost Obs 5	Obs 6		Obs 7	PresPost Obs 8										
2850 Lindell Rd		Pretest Obs 1		Obs 2				Obs 3		Obs 4			Pretest + Obs 5				Obs 6 PostPre	Obs 7					Obs 8	
401 Drake St (Intervention)			Pretest Obs 1	Obs 2			Obs 3		Obs 4 PresPost	Obs 5	Obs 6			Obs 7			Posttest + Obs 8							
2980 Robindale Rd			Obs 1		Pretest Obs 2						Obs 3	Pretest +		Obs 4		Obs 5		Obs 6	Obs 7 PresPost				Obs 8	
2801 Stewart Ave					Obs 1	Pretest Obs 2		Obs 3	Obs 4	Obs 5	Pretest Obs 6		Obs 7		Obs 8	PostPre retention								

\*A "+" designates the graduate student returning for additional data collection to maintain the sample size and account for inconsistent attendance.

\*Pres stands for presentation of The SunWise Program, Obs stands for Observation, Pre stands for Pretest, Post stands for a posttest

\*An observation taking place above or below a pretest or posttest designates the order of events that had taken place that day.

## SunWise Program

Participants at the four Boys and Girls Clubs designated as intervention sites received an interactive educational presentation. The presentation consisted of a 10-minute PowerPoint presentation, followed by two engaging activities lasting about 10 minutes, for a complete lesson time of 20 minutes. The SunWise program consists of quick and simple PowerPoint presentations specific to age group, one for ages 7 to 11 years old and one for 12 years to 18 years old. Participants were guided through the slides and learned the pros and cons of sunlight, the damage caused by UV rays, the importance of protecting their skin from these rays, when to protect their skin, and how to protect their skin. The lessons included information on reading the UV index, understanding SPF, and application of simple methods to protect their skin every day. The participants were taught to remember the catchy phrase, “Slip, Slop, Slap, Wrap” in order to remind them to slip on protective clothing, slop on some sunscreen, slap on a hat and wrap sunglasses around their face before spending time in the sun (see Appendix D).

The SunWise Program’s lesson was followed by an activity where the participants covered half of a UV color changing Frisbee with sunscreen and left the other half bare. The group was lead outside to observe how quickly the color changes, and was very effective in allowing participants to visualize the effects of UV radiation on cloudy and overcast days. The Frisbee began changing color in a matter of seconds while the side that the children applied sunscreen to remained unchanged, signifying

how quickly UV rays can damage skin. This served as an excellent visual aid for the participants to understand how the sun affects their bare skin.

A relay race was arranged asking for four participants to volunteer and compete to see who could correctly identify which items would keep them safe in the sun and wear those items the fastest. Items such as oversized sunglasses, large floppy hats, and capes, and umbrellas were laid out in front of the participants to choose from in an arbitrary order. The sunsafe regalia was mixed in with random items that would not necessarily help in the sun such as baby bibs, superhero masks, princess tiaras, and other non-protective items. At the end of the race, the efficacy of each item worn by the volunteers was discussed. The intention of this activity was to engage the participants in a fun way while showing them how quick and simple it is to be safe in the sun.

The SunWise Program concluded by allowing participants to make a bracelet or keychain using beads that change color when in UV light. These beads were provided by the Environmental Protection Agency's SunWise Program. The string used to make these items was Rexlace©, a glow in the dark material, which was intended to further entice the participants to wear them. In the interest of time, the bracelets and keychains had been started with the knots and keychain rings already in place so that the participants only had to add the beads and make the final knot. Placing this keychain on their keys or backpacks, and wearing the bracelets, is intended to serve as a reminder to implement sunsafe behavior when participants notice the beads changing color.



## Sunscreen Usage

Each location was provided with two quarts of SPF Rx brand broad spectrum SPF 30 sunscreen. In order to measure how much of the provided sunscreen was used, sunscreen bottles were weighed before beginning the program and on the last day of the program using a digital scale to determine how much of the bottle had been used after the intervention.

## Hypothesis

The study was focused on answering the research questions outlined below. Each research question focuses on a different goal of the study. The questions are followed by the associated null hypothesis signified as  $H_0$ .

Will educating youth through The SunWise Program about the importance of sun safety and how to be safe in the sun increase their knowledge on sun safety?

$H_0$ : Youth who participate in the SunWise Program maintain the same level of sun safety knowledge after the intervention.

Will educating youth through The SunWise Program about the importance of sun safety and how to be safe in the sun improve their attitudes toward sun safe behavior?

$H_0$ : Youth who participate in the SunWise program maintain the same attitudes toward sun safe behavior after the intervention.

Will educating youth through The SunWise Program about the importance of sun safety and how to be safe in the sun result in an increased implementation of sunsafe behavior while outside during recess?

H0: Youth who participate in the SunWise Program do not change their outdoor sunsafe behaviors after the intervention.

Will providing sunscreen while teaching youth about the importance of sun safety and how to be safe in the sun increase usage of sunscreen?

H0: Providing youth sunscreen will not increase usage of sunscreen after the intervention.

## Chapter 5. Results

A total of 228 participants were included in data analysis from 6 Boys and Girls Clubs with 94 in the intervention group and 134 in the control group. Originally 259 participants completed pretests, but 31 posttests could not be collected due to lack of attendance or transiency. Data from these pretests could not be matched with posttests and were eliminated from the data analysis, along with data from 5 participants for questions with incomplete responses.

Demographics collected on age and hair color from the pretest and posttest are displayed in Table 3. The age distribution shows that the majority of participants were in the 7 to 8-year age group. Very few participants (16.1%) had lighter color hair (red or blond) which usually indicates lighter skin tones that burn easily in the sun. The population consisted largely of 7 to 8-year-old participants with brown or black hair, including more young girls than boys.

*Table 3. Demographics for 228 Total Youths at 6 Boys and Girls Clubs of Southern Nevada Participating in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

<b>Gender</b>			
Male	45.50%	Female	53.20%
<b>Hair Color</b>			
Blond	15.20%	Brown	35.50%
Red	0.90%	Black	44.20%
<b>Age</b>			
7-8 years	58.40%	11-13 years	7.80%
9-10 years	31.70%	14-17 years	2.10%

Many questions in the measurement tool requested participants to report behaviors from the previous summer. These results are summarized with overall

pretests matched with posttests in Table 4. Using paired sample *t*-tests for questions with continuous data and McNemar Tests for questions with binary data, the overall significance was calculated and is listed next to each question's pretest to posttest proportions. These answers should not change significantly from the pretest to posttest to demonstrate that participants are filling out the surveys reliably. Accepting the null hypothesis, that the responses before and after participation in The SunWise Program are largely the same, strengthens the notion that participants answered questions about their past summer consistently, supporting the dependability of self-reported data. Only question 24 shows a statistically significant difference in responses from the pretest to posttest. Results from questions 20, 21, 22, and 23 show that last summer, before involvement in the SunWise Program, the majority of participants answered that they "Never" engaged in SunWise behaviors of wearing sunglasses, hats, long-sleeved shirts or sunscreen. Less than 44% of all participants answered that they have had a school lesson on sun protection before this study.

*Table 4. Pretest and Posttest Response Summary for Self-Reported Behaviors of the Previous Summer using Paired Sample t-Test from Control and Intervention Locations in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

	Topic	Desired Answer	Overall (%)		p-value
			Pre	Post	
15	Do you talk to your family about being sunsafe?	Yes	44.5	43.7	0.909 <sup>M</sup>
16	Do you talk to your friends about being sunsafe?	Yes	29.7	31.4	0.694 <sup>M</sup>
17	Last summer how many days did you go outside per week?	0 to 1	19.2	21.0	0.041
		2 to 3	27.9	31.4	
		4 to 5	14.0	18.3	
		6 to 7	38.4	28.8	
18	Last summer how many hours did you go outside per day?	0 to 1	21.4	21.0	0.742
		1 to 2	37.6	37.1	
		3 to 4	18.8	23.1	
		5 to 6	21.8	18.3	
19	Last summer how many hours did you spend at the beach or pool?	0 to 1	31	34.5	0.081
		1 to 2	31.4	34.5	
		3 to 4	19.2	17	
		5 to 6	17.9	13.6	
20	Last summer did you wear a hat?	All the time	17.4	21.4	0.089
		Sometimes	31	31.4	
		Never	51.1	46.7	
21	Last summer did you wear a long sleeved shirt?	All the time	9	10.2	0.094
		Sometimes	24.9	30.6	
		Never	65.1	58.5	
22	Last summer did you wear sunglasses?	All the time	31.8	28.8	0.600
		Sometimes	30.1	33.2	
		Never	37.6	37.6	
23	Last summer did you wear a Sunscreen?	All the time	34.1	30.6	0.307
		Sometimes	30.6	32.8	
		Never	34.9	36.2	
24	What SPF was your sunscreen?	less than 15	19.2	10.5	0.000
		15 to 30	10.9	10.9	
		30 or higher	14.8	28.8	
		I don't know	54.6	49.3	
25	How many times did you get sunburned last summer?	None	49.3	47.2	0.405
		1 or 2	34	34.5	
		3 or more	16.2	17.9	
26	Did any of these sunburns hurt?	None	27.5	22.7	0.929
		1 or 2	27.1	31	
		3 or more	9.2	8.7	
		Not Sunburned	35.8	37.2	
29	Does your school announce the UV index?	Yes	24.9	23.5	0.770 <sup>M</sup>
30	Have you ever had a school lesson on sun protection?	Yes	43.2	39.7	0.515 <sup>M</sup>

M signifies a p-value from a McNemar Test, all others were analyzed using t-tests

Participants answered questions prior to the intervention on their attitudes related to why they did not wear sunscreen or why they did not wear a hat and/or a long sleeved shirt outside. Table 5 displays the results from these questions. The directions for these questions allowed them to choose as many answers as they felt applied to them. The majority of participants responded that they do not wear sunscreen because they forget to apply it (32.5%-39.9%), and many responded that they do not wear sunscreen because they do not have any sunscreen at home (30.7%-28.5%). This was also the case for not wearing a hat while outside with about 40% of participants originally answering that they forget to wear a hat, and about 30% of participants responded that they do not wear a hat while outside because they do not have a hat.

*Table 5. Pretest and Posttest Response Summary from Participants at Control and Intervention locations on Attitudes about Sunsafe Behavior Prior to Intervention of the SunWise Program in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

	<b>Reasons Why I Don't Wear Sunscreen</b>	<b>Pretest %</b>	<b>Posttest %</b>
<b>10</b>	It takes too long to apply	13.60	11.84
	I forget to apply it	32.46	39.91
	It stings my eyes	17.98	17.90
	It's hard to put on my whole body	15.35	17.10
	I don't have any sunscreen	30.70	28.50
	I do wear sunscreen	33.77	33.33
	<b>Reasons I Don't Wear a Hat/Shirt Outside</b>	<b>Pretest %</b>	<b>Posttest %</b>
<b>11</b>	I forget to wear a hat	41.22	28.94
	I don't like to wear a hat	28.07	30.70
	I don't have a hat	30.26	29.82
	It's too hot to wear a long-sleeved shirt	26.75	27.63
	I do wear a hat or shirt	22.81	28.95

The remaining survey questions were analyzed using Paired T-tests to determine if the increase in a participant choosing a desired answer is statistically significant.

Table 6 lists the overall proportions and the conclusion for whether the null hypothesis, that the responses before and after participation in the SunWise Program are the same, has been accepted or rejected.

*Table 6. Pretest and Posttest Response Summary from Participants at Intervention and Control locations on Knowledge and Attitude Based Questions Before and After Participation in the SunWise Program with Associated Conclusion of the Null Hypothesis in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada.*

#	Topic	Desired Answer	Intervention			Control		
			Proportion (%)			Proportion (%)		
			Pre	Post	H <sub>0</sub>	Pre	Post	H <sub>0</sub>
4	Does your skin burn easily?	Yes or No	68	67	Accept	67.2	67.2	Accept
5	What are ways to keep your skin safe in the sun?	Sunscreen & Covered Clothing	39.4	63.8	Reject	36.6	41	Accept
6	What UV level requires the most sun protection?	5	10.7	43.6	Reject	7.5	6.7	Accept
7	You can get sunburns on a cloudy day.	TRUE	40.4	81.9	Reject	22.4	16.4	Accept
8	You only need to wear sunscreen at the beach/pool.	FALSE	37.2	69.1	Reject	42.5	39.6	Accept
9	Keeping your skin safe in the sun is	Easy to do	66	64.9	Reject	58.2	59	Reject
12	Do you like to get a tan?	No	53.2	59.6	Reject	62.7	62.7	Accept
13	Do you think people look healthy with a tan?	No	66	70.2	Reject	70.9	65.7	Accept
14	Circle all the areas you would put sunscreen on while at the beach/ pool.	All body areas	37.2	56.4	Reject	26.9	29.1	Accept
27	Will you try to play in the shade this summer?	Yes/ Most Likely	58	68.1	Accept	69.4	62.7	Accept
			34	40.4	Accept	44	41.8	Accept
28	Will you put on sunscreen this summer?	Yes/ Most Likely	65.9	76.6	Accept	72.4	70.2	Accept
			45.7	53.2	Accept	53	53	Accept

Paired sample *t*-tests were conducted to evaluate whether the change in knowledge was statistically significant from the pretest to the posttest. Table 7 displays the results of responses to knowledge based questions in the intervention group. The

null hypothesis was that there would be no change in knowledge or attitudes based on participation in the SunWise Program. The null hypothesis was rejected, as a statistically significant change in knowledge was observed for all participants in the intervention group, shown by a p-value of less than 0.05. Results of the knowledge based questions answered by the intervention group were compared to the results of the control group to support the value of The SunWise Program as the possible reason for increase in knowledge. The control group results for the posttest show slight increases in question 5 and 14, but results were not statistically significant.

The results showed that the intervention group was more likely to correctly identify the two listed methods to keep skin safe from four given choices in question 5. This question was analyzed as correct if both methods were identified. The paired sample *t*-test was significant with a calculated  $t(93) = 3.32$ ,  $p < 0.05$ , in the intervention group. This indicates a significant increase in knowledge gained from the pretest ( $M=1.43$ ,  $SD=0.58$ ,  $N=94$ ), to the posttest ( $M=1.70$ ,  $SD=0.60$ ,  $N$  of 94). The calculated effect size, displayed in the table, was moderate based on Cohen's conventions (Cohen, 1988). The mean increase was 0.27, with the 95% confidence interval for the difference between the means of 0.11 to 0.44. The researcher rejected the null hypothesis.

The results of the paired sample *t*-test were significant for question 14 on identifying that all seven listed areas of the body should have sunscreen applied to them, with a calculated  $t(93) = 3.14$ ,  $p < 0.05$ , in the intervention group. This indicates a significant increase in knowledge gained from the pretest ( $M=2.61$ ,  $SD=3.40$ ,  $N$  of 94), to the posttest ( $M=3.95$ ,  $SD= 3.49$ ,  $N= 94$ ). The calculated effect size, displayed in the



table, was moderate based on Cohen’s conventions (Cohen, 1988). The mean increase was 1.34, with the 95% confidence interval for the difference between the means of 0.49 to 2.19. The researcher rejected the null hypothesis. This question was analyzed as correct if all 7 areas were selected, and not on whether the number of areas marked increased, which may have shown a greater change from pretest to posttest.

*Table 7. T-Test Results for Knowledge Questions from Pretests and Posttests in Intervention and Control Groups Before and After Participation in the SunWise Program in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada.*

Intervention, N =93									
#	Test	M	SD	$\mu$	95% CI	t	p-Value, (2-tailed)	Eta	Effect of Intervention
5	pre	1.43	0.58	0.27	(0.11, 0.44)	3.32	0.001	0.106	Moderate
	post	1.7	0.6						
14	pre	2.61	3.4	1.34	(0.49, 2.19)	3.14	0.002	0.096	Moderate
	post	3.95	3.46						
Control, N =134									
#	Test	M	SD	$\mu$	95% CI	t	p-Value, (2-tailed)	Eta	Effect of Intervention
5	pre	0.99	0.12	0.05	(0.10, 0.004)	2.14	0.034		Not Significant
	post	0.93	0.25						
14	pre	4.77	2.27	0.46	(0.99, -0.06)	1.75	0.083		Not Significant
	post	4.31	2.67						

McNemar tests were conducted to evaluate whether the change in knowledge was statistically significant from the pretest to the posttest. Table 8 displays the results of responses to knowledge and attitude based questions for the change from the pretest to the posttest. McNemar Test was used to test the null hypothesis that the probability of marking a desirable answer before and after joining in the SunWise Program is the same. Desired answers were signified as “1” and undesirable answers were signified

by a “0” in the binary data set analyzed in IBM SPSS. The null hypothesis is rejected if the test statistic,  $\chi^2$ , is greater than the critical value of 3.84 determined using 1 degree of freedom within a 95% confidence interval (Zaiontz, 2013). The results are considered significant if the p-value is less than 0.05. The significance values are reported as the asymptotic calculations. All  $\chi^2$  values were calculated with continuity correction of 1.0 and 1 degree of freedom. An odds ratio is also calculated with the McNemar test. An odds ratio of higher than 1 indicates that the exposure, the SunWise Program, is associated with higher odds of participants choosing the desired answer. Odds ratios (OR) are reported with their associated 95% Confidence Intervals (95% CI).

A McNemar test for knowledge based questions 6, 7, 8, 9, and 12, show statistically significant results with  $\chi^2$  values that allow rejection of the null hypothesis. The data provides evidence that participation in the SunWise Program results in increased knowledge and improved attitudes toward sun safety. The associated odds ratios support this conclusion by showing there is a higher chance of increasing knowledge if exposed to the SunWise Program. The 2x2 contingency tables for the intervention group results in questions 9 and 12 had a sum of values lower than 20 in the discordant cells. In the case where the sum of discordant cells is too low, the Fisher’s Exact Tests is employed for those p-values (Toutenburg, 2002). Comparing the results of the control group to the intervention group further confirms these beliefs as results were insignificant and the  $\chi^2$  values were too low to reject the null hypothesis. Without exposure to the SunWise Program, knowledge did not significantly increase in the control group. Unfortunately, attitude based questions 13, 27, and 28, did not produce statistically significant results.

*Table 8. McNemar Test Results for Knowledge and Attitude Questions from Pretests and Posttests in Intervention and Control Groups Before and After Participation in the SunWise Program in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

<b>Intervention, N=93</b>						
<b>#</b>	<b>Topic</b>	<b><math>\chi^2</math></b>	<b>Significance</b>	<b>Conclusion</b>	<b>O R</b>	<b>95% C I</b>
4	Does your skin burn easily?	0.000	1.000	Insignificant	1.070	(2.22,0.52)
6	At what UV level do you need the most sun protection?	41.136	0.000	Significant	45.000	(326.643, 6.203)
7	You can get sunburns on a cloudy day.	32.089	0.000	Significant	14.000	(45.168, 4.339)
8	You only need to wear sunscreen at the beach / pool.	17.521	0.000	Significant	4.330	(8.945, 2.099)
9	Keeping your skin safe in the sun is	12.906	0.001 <sup>F</sup>	Significant	1.000	(2.851, 0.351)
12	Do you like to get a tan?	28.673	0.000 <sup>F</sup>	Significant	1.857	(4.655, 0.741)
13	Do you think people look healthy with a tan?	0.321	0.571	Insignificant	1.330	(2.818, 0.631)
27	Will you try to play in the shade this summer?	1.633	0.201	Insignificant	1.730	(3.629, 0.822)
28	Will you put on sunscreen this summer?	2.700	0.100	Insignificant	2.000	(4.273, 0.936)
<b>Control, N=134</b>						
<b>#</b>	<b>Topic</b>	<b><math>\chi^2</math></b>	<b>Significance</b>	<b>Conclusion</b>	<b>O R</b>	<b>95% C I</b>
4	Does your skin burn easily?	1.000	1.000	Insignificant	1.000	(1.761, 0.568)
6	At what UV level do you need the most sun protection?	0.413	0.520	Insignificant	1.230	(2.150, 0.699)
7	You can get sunburns on a cloudy day.	1.633	0.201	Insignificant	1.730	(3.630, 0.822)
8	You only need to wear sunscreen at the beach or the pool.	0.167	0.683	Insignificant	1.160	(1.980, 0.683)
9	Keeping your skin safe in the sun is	17.551	0.000	Significant	1.000	(2.665, 0.375)
12	Do you like to get a tan?	16.038	1.000	Insignificant	1.000	(1.859, 0.538)
13	Do you think people look healthy with a tan?	0.973	0.324	Insignificant	1.467	(2.827, 0.761)
27	Will you try to play in the shade this summer?	1.250	0.263	Insignificant	1.430	(2.495, 0.818)
28	Will you put on sunscreen this summer?	0.103	0.745	Insignificant	1.160	(2.190, 0.622)

F= Fisher's Exact Test p-value used

A total of 8 behavior observations were conducted at each club location to assess whether change in behavior was statistically significant from before to after the

intervention. Every observation had varying numbers of participants so observation data was standardized by calculating rates of participants engaging in a sunsafe behavior divided by total number of participants each day. These rates were analyzed using the Wilcoxon Signed Rank Test as normality could not be assumed for this distribution. Table 9 displays a summary of these results.

A Wilcoxon Signed Rank Test revealed no significant difference in rates of participants in the intervention group seeking shade following participation in the SunWise Program,  $z=-0.51$ ,  $p=0.61$ , with a small effect size ( $r=0.10$ ). The median score increased from before the intervention ( $Md=0.46$ ) to after the intervention ( $Md=0.48$ ).

A Wilcoxon Signed Rank Test revealed no significant difference in rates of participants in the intervention group wearing hats following participation in the SunWise Program,  $z=-1.60$ ,  $p=0.11$ , with a small effect size ( $r=0.33$ ). The median score remained steady from before the intervention ( $Md=0.00$ ) to after the intervention ( $Md=0.00$ ).

A Wilcoxon Signed Rank Test revealed no significant difference in rates of participants in the intervention group wearing sunglasses following participation in the SunWise Program,  $z=-1.46$ ,  $p=0.14$ , with a small effect size ( $r=0.30$ ). The median score remained steady from before the intervention ( $Md=0.00$ ) to after the intervention ( $Md=0.00$ ).

A Wilcoxon Signed Rank Test revealed no significant difference in rates of participants in the intervention group wearing covered clothing following participation in the SunWise Program,  $z=-0.89$ ,  $p=0.37$ , with a small effect size ( $r=0.18$ ). The median

score increased from before the intervention (Md=0.22) to after the intervention (Md=0.24).

*Table 9. Daily Rates of Behavior Observations Before and After Intervention using Wilcoxon Signed Ranks Test in Overall Participants, Intervention Group, and Control Group in the Study, Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada*

Behavior	Medians		Overall			
	Pre	Post	P	z score	r	Effect Size
Seeking Shade	0.485	0.579	0.240	-1.180	0.170	Small
Hats	0.000	0.000	0.271	-1.100	0.159	Small
Sunglasses	0.000	0.000	0.110	-1.600	0.231	Small
Covered Clothing	0.203	0.203	0.295	-1.010	0.146	Small
	Medians		Intervention			
	Pre	Post	P	z score	r	Effect Size
Seeking Shade	0.464	0.478	0.610	-0.510	0.104	Small
Hats	0.000	0.000	0.109	-1.604	0.327	Medium
Sunglasses	0.000	0.000	0.144	-1.460	0.298	Medium
Covered Clothing	0.217	0.240	0.374	-0.890	0.182	Small
	Medians		Control			
	Pre	Post	P	z score	r	Effect Size
Seeking Shade	0.495	0.650	0.610	-2.380	0.486	Medium
Hats	0.000	0.000	0.109	-0.552	0.113	Small
Sunglasses	0.000	0.012	0.144	-1.210	0.247	Small
Covered Clothing	0.203	0.141	0.374	-0.700	0.143	Small

To determine changes in sunscreen usage, bottles were weighed before the intervention and after the intervention. Each location began the study with a bottle weighing 2.4 ounces. The sunscreen bottles were measured again at the end of the study, and interestingly 5 of the 6 locations resulted in a bottle weighing 2.2 ounces. The Lied Memorial clubhouse, a control location providing the highest number of participants (62), had a final sunscreen bottle weight of 1.4 ounces. Locations reported difficulty in monitoring the use of the sunscreen. This resulted in many of the locations choosing to remove the sunscreen, thus prohibiting the use by participants. Results

from the sunscreen program component were inconsistent and could not be analyzed due to inconvenient and difficult to manage procedures.

## Chapter 6. Discussion

The research question analyzed by this study was if education of youth through The SunWise Program would result in an increase in their knowledge on sun safety, a change in their attitudes towards sunsafe behavior, and an increased implementation of sunsafe behavior while outside. The hypothesis is based on the Health Belief Model, postulating that teaching youth about the benefits of sun safety and their susceptibility of sunburns using The SunWise Program will increase knowledge on sun safety, improve attitudes toward sun safety, and increase sun safe behaviors. The Health Belief Model postulates that teaching individuals (participants at the Boys and Girls Clubs) about a health risk factor (sunburns) and ways to prevent this risk factor (sun safety education), will encourage individuals to take action to prevent the risk factor. Furthermore, developing the self-efficacy in individuals to change their behavior toward preventing a risk factor, will give individuals the confidence to make that change, because they will believe that they are able to make the change.

### Behavior Observations

Behavior observations could not be conducted during regularly scheduled recesses because different club locations had very few or no scheduled recesses, as members are taken to recess as time permits. The phenomenon of the Social Desirability Effect was observed through the self-reported responses pretest and posttest administration where participants answered “All the Time” to questions examining whether participants engaged in certain sunsafe behaviors in the previous summer. This seemed to be an answer chosen to please the graduate student conducting the pretest and posttest. Since recesses were unscheduled and mainly took

place when observers arrived at the club, participants were often noted as connecting the observers and graduate student to being sunsafe, causing the graduate student to serve as a reminder to participants to use sunscreen. The Reynold's Clubhouse, a control site, provides an example of this situation. Participants at this location excitedly brought sunglasses to use during observations and enthusiastically shared with the observer that they were engaging in sunsafe behavior.

Participants often acted upon this prior knowledge before the intervention, documented during behavior observations. Observers added notes on the data collection sheets at the James Clubhouse where participants encouraged each other to use sunscreen during an observation that took place before the intervention. The Lied Clubhouse, a control location, had participants who had recently had a school lesson on sun protection due to an outdoor field trip. These participants brought their own hats and sunscreen to share with other participants.

Although participants had prior knowledge on sun safety, their information was incomplete. Comprehension concerning proper sunscreen usage, the type of sunscreen to use, the necessity for a full brimmed hat, seeking shade, wearing covered clothing, or the effect of their environment on increasing the need for sun safety. Participants had shown surprise at learning they can still get sunburned on cloudy days and that they need sun protection all year long, not just in the summer. The intervention provided factual and complete information about sun safety methods to participants.

Behavioral observations were not very representative of intended changes by participants. Some of the club locations had little to no opportunity for shade for



participants to play in, leaving youths temporarily standing under shadows of a neighboring tree or the building while waiting for their turn in the game. Youths are discouraged from bringing hats and sunglasses to school each day. Sunglasses are viewed as a liability to be stolen or lost. Hats are not permitted in school classrooms as part of the Clark County School District's dress code policy. These systemic barriers as well as the additional cost for families to provide hats, sunglasses, and sunscreen at home are significant external factors preventing behavior change in participants. Additionally, the time span of the study was very short, only allowing participants one week after the study to change behaviors and build habits.

## Survey

Results on behaviors from this survey were based on self-reported data, which differed slightly from the pretest to the posttest. The reliability of self-reported data in research is contentious, but the results of this data set stayed relatively consistent and statistically insignificant. Many of the participants were in the youngest age group and may have taken advantage of the new "teacher" conducting different activities from the expectations of the usual club supervisors or classroom teacher. Youth in the 7 to 8 year old age group wanted more help than they actually needed, perhaps because they enjoyed this attention and novelty of the researcher. This seemed to be the case while administering the surveys as pretests and posttests, where participants who were capable of reading had requested to have the questions read to them, instead of reading for themselves.

There were no statistically significant changes between the pretest and posttest in all behavior questions except question 24 on recalling the SPF on their personal sunscreens used last summer, where answers changed often.

The results from the survey indicated statistically significant increases in knowledge among youth from pretest to posttest. These knowledge questions examine comprehension of the protective factors for skin tone against UV radiation, methods to stay safe in the sun, how to interpret the UV index, the effects of UV Radiation in different weather conditions, and proper sunscreen usage. The ability of the SunWise Program to change knowledge is an important finding, as the health belief model posits that in order for behavior change to occur, individuals must understand that there is a negative health consequence that can be avoided and that they are able to successfully take action to avoid that consequence. Study participants were significantly more likely to understand that there are ways they can keep their skin safe and to identify proper ways to do so. The results from the intervention groups displayed statistically significant increases in knowledge of these topics. This was compared to the results from the control groups, which were statistically insignificant. This supports the conclusion that the knowledge increases, which took place within two weeks, may have been due to participation in The SunWise Program.

Question 5 had participants choose the correct methods of skin protection (sunscreen and covered clothing) from a list of four options. Results showed that 10% of participants selected “eating cereal” and/or “listening to the radio” as answers. Inquiring why some participants chose that answer after collection of surveys, participants postulated that people listen to the radio inside and were therefore safe from the sun.

Eating cereal is often marketed as a generally healthy activity and was associated as a positive behavior alongside applying sunscreen.

Question 8 asked what environment sunscreen should be applied in, but was worded in a misleading way. If not carefully read, participants skipped over the word “only” in the question, “You only need to wear sunscreen when you are at the beach or pool,” and marked the statement as True. Some participants were confused by this question and began answering “beach” or “pool” as places that would require sunscreen application instead of examining whether these are the only environments that would require sunscreen application.

Many participants were unfamiliar with the term “tan” and requested clarification on questions 12 and 13. Participants overwhelmingly asked for clarification on the definition of a tan. Once the term was explained as skin getting darker from spending time in the sun, responses consisted either of confusion or distaste. This may be due to a large portion of the population coming from cultures where brown skin is prevalent and fair skin is the desired feature for beauty. Conversely, the general culture in the United States, where whiter skin is prevalent, views tanned skin as a vanity trait.

The style of answer choices was a seemingly new concept for many participants. The ability to mark “I don’t know” was seen as an exciting opportunity. Many participants would add in this answer choice to the provided dichotomous choices when they did not feel confident choosing one answer. These participants were asked to make a choice in the provided answers when the researcher checked the survey for completion. Making a response choice on the Likert scale was also a novel notion to many participants and

caused some confusion. The responses falling between “Yes” and “No,” (“Most Likely” and “Probably Not,”) were largely unused.

Although questions related to attitudes of sunsafe behaviors did not change significantly, it is important to note that a large percentage of participants were already reporting positive attitudes in the pretest. In addition, nearly all attitude questions improved between the pre- and post-test, although they did not reach significance. Participants do appear more likely to “play in the shade” and “put on sunscreen” this summer. This finding is promising in terms of public health, as Kyle et al. (2008) reported in their economic evaluation of SunWise that even modest behavioral changes produce cost-effective results. An important attitude change on the necessity of paying attention to their skin was addressed during this study, but not measured. Educating this population that everyone needs to protect their skin regardless of ethnicity or darker skin is critical to changing attitudes and correcting misconceptions.

### Sunscreen Usage

Sunscreen bottles left at each club location for participants to use at will, did not yield tenable results because this was not a well-managed protocol. Monitoring completion of the sign in sheet, while also ensuring participants were not mishandling the sunscreen, had placed extra pressure and responsibility on an already very busy staff at the Boys and Girls Clubs of Southern Nevada. Additionally, lack of clear communication from the graduate student with all staff at the clubhouse on procedures for sunscreen usage lead to data loss and results with sunscreen usage were lower than anticipated.

Participants were asked to fill in their age and the date of each time sunscreen was applied on a sign in sheet, placed alongside the sunscreen bottle, to measure how often sunscreen was used each day. These sheets were unfortunately not consistently used and had incorrect dates entered, such as “December 12<sup>th</sup>” or “January 32<sup>nd</sup>,” while the intervention was conducted in April. Four of the clubs had blank sign in sheets next to sunscreen bottles which displayed evidence that the sunscreen bottle had been used. Volunteer observers witnessed participants rushing to the sunscreen bottle in large groups and applying sunscreen without filling out the sign in sheet. On many occasions the sign in sheet was misplaced or discarded and had to be replaced, resulting in missing data on sunscreen usage.

The intent was to have the sunscreen bottle placed in a visible location with easy access to the participants. This was not easily implemented and placed stress on staff at each location, which communicated to the graduate student that participants were abusing the sunscreen, in most cases by applying too much and too frequently. Due to the irresponsibility of the participants, staff at each club kept the sunscreen bottle behind the front counter, out of view of the participants, and only provided it to participants who requested to use it in order to better monitor the situation.

During the study, the graduate student conferred with staff at many locations for input on developing a better plan of action for these sunscreen bottles. Participants could not independently retrieve the sunscreen, and staff concluded that the bottles had to be constantly monitored. One possible alternative method discussed involved leaving tickets permitting sunscreen usage available to participants in a visible location. The participants would submit tickets to staff at each club in exchange for one pump of

sunscreen from the bottle and collected tickets would provide a measure of sunscreen usage. Due to the hectic schedules and numerous responsibilities of staff at the Boys and Girls Clubs, this would have placed additional stress on them. The clubs do not have resources to manage and monitor sunscreen usage.

## Community Impact

Taking external factors into account is important in determining the effects of sun safety education. Participants are influenced by their community at many levels, specifically through their classroom teachers, youth leaders from Boys and Girls Clubs, parents, friends, as well as through the media. Many participants have had school lessons on sun safety in other schools, and repetition of this information in different settings will further enhance knowledge and attitudes in the participants, which ultimately may lead to behavior change. The Boys and Girls Club organization has many community partners and encourages involvement from the public as volunteers. This community involvement had a surprisingly large impact observed in the study.

Although the study was not designed around the Social Ecological Model, this study has done an excellent job of exemplifying the importance and ability to influence change. By educating individuals, influencing attitudes, and increasing sunsafe behaviors, participants will conceivably will speak to their family and friends about this knowledge, proliferating factual information on sun safety at the interpersonal level. Behavior observations were conducted by volunteers from all over Clark County, which brought more community members to each location to breed positive social change. Outcomes from this were so positive and inspirational in witnessing what can transpire when providing an opportunity to connect with the community. Volunteers also learned

from this experience and admitted that it served as an important reminder to take sun safety seriously and make it more of a priority. Many of the volunteer observers work together at a branch of the Apple Store, and were able to document the amount of hours they spent volunteering with the Boys and Girls Club promoting sun safety with their company. This resulted in Apple providing a monetary donation to the Boys and Girls Club of Southern Nevada to fund more educational programs by matching the pay each volunteer would have earned if they had been working the corresponding number of hours in their store. . Different organizations working together to provide support for these programs will hopefully incentivize the Boys and Girls Clubs of Southern Nevada to continue these partnerships and continue these programs.

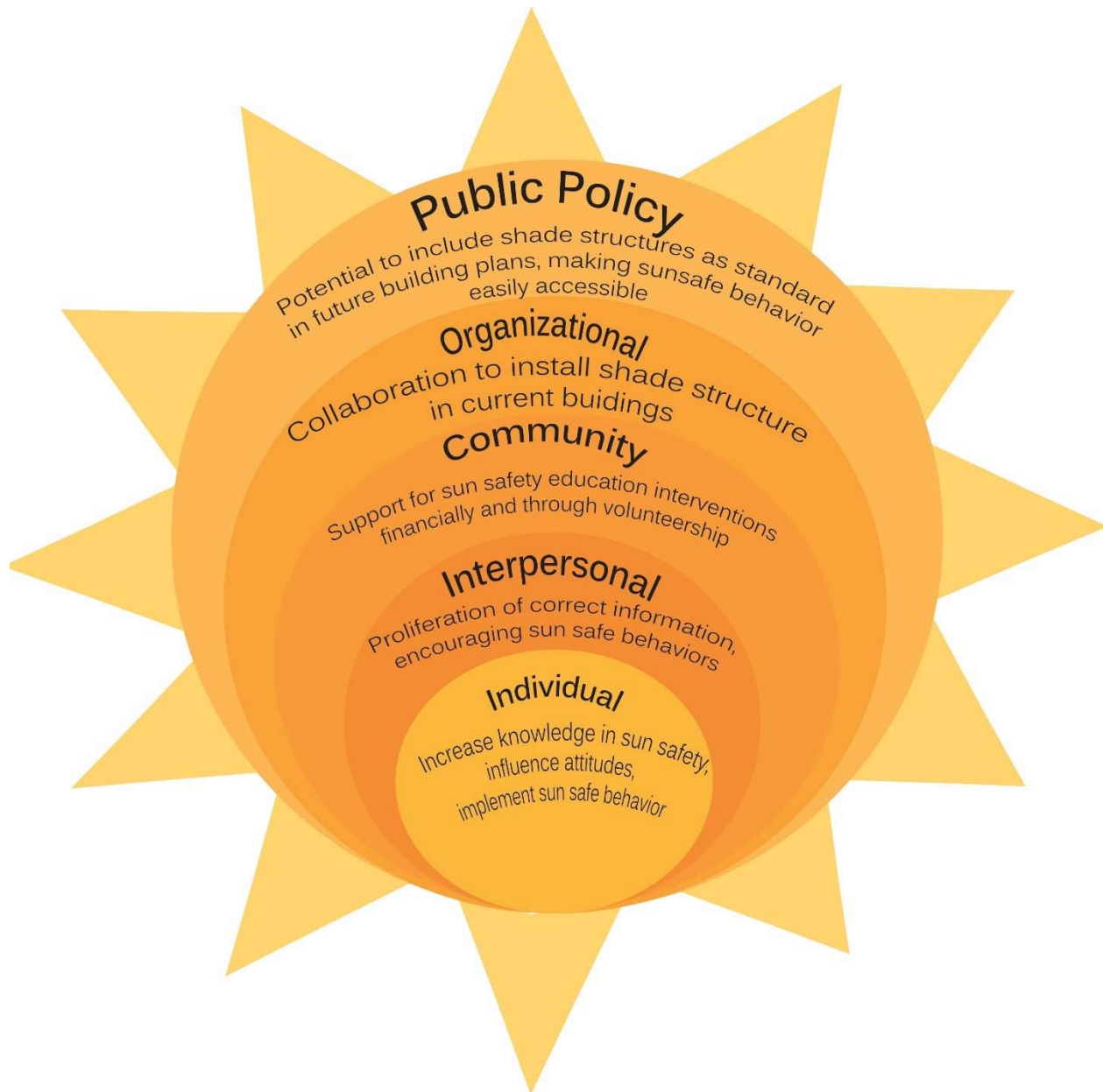
At the institutional level, an influential local corporation was made aware of the deteriorating building at one of the locations where a volunteer observer conducted behavior observations. The volunteer communicated how the study would not be able to document behavior change due to structure of the building. Participants at this location have no opportunity to find shade to enjoy their recesses safely, and together presented this information to some local contacts. This volunteer conferred with the graduate student on providing more help to this location. This has resulted in the corporation, a local institution, to take this study into consideration and introduce changes to the facility and are now in plans to incorporate a shade structure at the Boys and Girls Club location.

Bringing outside influences and educational interventions into these centers has brought about unexpected positive results. Figure 1 provides a visual summary of the relationships and their results through the ecological model. External organizations and

institutions are paying attention to the need for sun safe education for youth in Clark County and are taking action to implement changes. Starting an educational effort to influence knowledge, attitudes, and behavior concerning sun safety lead to community support for such interventions, and built relationships with organizations to instill a change in promoting sun safe behaviors. Continued efforts in this forum can potentially lead to policy change aimed at ensuring a shade structure is included in all future designs for Boys and Girls Clubs of Southern Nevada.



Figure 2. Assessing the Impact of the SunWise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada through the Ecological Model



## Validity

Internal validity may have been effected due to testing confounds and attrition. The pretest and posttest were administered about two weeks apart. Participants may have been very familiar with the measurement tool causing them to answer questions

differently than if asked to answer new questions. The environment also greatly differs from that of a traditional classroom. Students in a classroom follow procedures set by their teacher to focus on the task at hand, reinforced by built teacher student relationships (Thomas, 1974). Youths at the Boys and Girls Clubs are at an afterschool recreational program and may not be as motivated to complete a pretest and posttest, which may be viewed as additional testing right after a full day at school. The graduate student did not work with the participants enough to develop an effective teacher to student relationship to elicit classroom behavior. For this reason, many participants would ask for help in reading the questions, although most were observed to not actually require assistance. Participants assisting younger club members, as well as the graduate student assisting the younger participants may have confounded results. Since a majority of behavior observations were conducted by the observer gathering participants instead of observing participants outside during a regularly scheduled recess, internal validity may have been confounded by the Social Desirability Effect.

Transiency is very common in most Boys and Girls Club locations and caused a loss of data in this study. Loss to follow up was an issue in some club locations, as a total of 259 youths completed the pre-test and 228 youths completed the posttest, resulting in a loss of data from 31 participants. The total sample size of 228 used in this study should be large enough to avoid any significant issues regarding this loss of data. The internal validity may have also been confounded by outside influences of information on sun safety. Close to 40% of participants responded that they have had a school lesson on sun safety prior to this intervention. At the introduction of this study to the club members, participants were often eager to share their prior knowledge on sun

safety with the graduate student. Some participants would begin listing sunsafe behaviors usually limited to wearing hats, sunglasses, and applying sunscreen. Participants were unaware of simple methods to follow such as avoiding outside activity during peak UV hours from 10 am to 4pm, or seeking shade while outdoors. They did not know how to read sunscreen labels in understanding which SPF level to utilize, or to make sure they use a broad spectrum sunscreen. Participants were unaware that they must completely rub the sunscreen lotion into their skin, and to reapply every two hours or after playing in the water. All of this information was discussed in the lesson from the SunWise Program. The act of administering the pretest recalled and engaged prior knowledge in the participants, pretest sensitization, affecting the ecological validity of the study. Therefore, a true control group could not be used to determine significant increases in behavior observations.

Internal validity was controlled for by use of multiple control and intervention groups, multiple days of behavior observations, using randomized selection of club locations, randomized selection of participants, and randomized assignment to a treatment group. Internal validity was also controlled for by using a blind study as participants did not know whether they were in the control or intervention group. Measurement validity was achieved through face validity and content validity, as the measurement tool was pulled from sources that have already been validated nationally (Kyle, 2008). Although efforts were made to establish a large sample size from geographically diverse locations in Clark County, external validity of the study was low.

## Limitations

Possible sources of error included a lack of communication with the staff at each club in how participants recorded use of sunscreen. The Boys and Girls Clubs of Southern Nevada hire numerous employees who all share responsibilities of the front counter. In some of the club locations, communicating with a new member of staff at each visit caused improper implementation of sunscreen procedures. One limitation to this study was the inability to maintain a consistent sample size of participants at each club. The study began with an average of 50 signed parent permission forms and lost participants at the time of student assent and pretesting.

Attrition is always a concern in any study, and was expected at the Boys and Girls Clubs, but efforts were made to prevent this from becoming a significant issue. Attendance over the month of the intervention period was actively encouraged by staff at each club by verbal reminders from site directors to participants and parents to bring their child consistently over the next month. Time constraints added to the difficulty of gathering as many participants as possible during each visit. Parents of participants came to pick up their club member at random times, sometimes during the intervention or behavior observation. Club members are required to finish certain activities, such as homework club or snack time, before working with the graduate student, and by the time participants are available, frequency of parents picking up their club member increases. These time constraints paired with inconsistent attendance made it difficult to maintain the sample size. The graduate student returned to each club 2 and sometimes 3 times for each step. Although time constraints and attendance were difficulties in this study,

the inconsistent weather in April provided real world examples of how sunsafe behavior is needed all year, in all types of weather.

Error may have also occurred as a result of miscommunication on how to observe participants by the graduate student to the volunteer observers. This was controlled for by training observers to use the SOPLAY methods. Depending on the demographic makeup of the participating clubs, results may not be generalizable to other Boys and Girls Clubs of Southern Nevada or to Clark County. This demographic data was not collected.

## Ethics

All minorities, ages, genders, and ethnicities were included in this study regardless of socioeconomic status. This study focused on building strong sun safety habits at a young age in hopes that these behaviors continue after study completion. The intervention locations participated in The SunWise Program before being administered their posttests. Upon completion of the study, the control locations were also able to participate in The SunWise Program in order to gain the knowledge and benefits of the interactive presentation. Only children in the six club locations were included in this study; no adults were included. Minimal harm was detected, as this intervention is educational, observational, and protective. No personal identifying information other than age was used in this study. Providing informed consent to parents in both English and Spanish ensured that the majority of parents were able to comprehend the study intentions and that clear consent was attained.

## Recommendations

An important issue to focus on for The SunWise Program is to target the misconceptions in sun safety for minority populations as they comprise a significant portion of the high risk population. It is important to address cultural barriers such as language, and also to clear common fallacies like that of melanin being completely protective against sun damage. Perhaps including famous examples of mortality due to skin cancer in minority populations, such as that of singer Bob Marley, to inculcate the fact that Skin Cancer affects everyone regardless of race or ethnicity. Change in attitude to move away from sun and indoor tanning is important in Caucasian populations, while change in attitude toward the importance of sun safety behaviors, even with skin naturally protected by higher levels of melanin, is important in African American and Hispanic populations. The SunWise Program should be updated to include current issues in addition to changing attitudes on tanning skin through indoor tanning options. This is especially important in the program geared toward youth in the teen age group, who utilize these products and services under the false pretense that they are being sunsafe. For example, when deciding to get a gel manicure, people should apply sunscreen to their hands prior to going to a nail salon as the LED lights used to cure the gel manicures are actually UV emitters. Additionally, the cosmetic industry has taken great steps to add SPF 15 in various products used daily, but people tend to forget that reapplication of sunscreen is necessary every 2 hours. Information such as this is important to share with youth to clear newly developing misconceptions on sun safety.

Any program implemented into the Boys and Girls Club of Southern Nevada should not place additional responsibilities on staff at the clubs. Much of the staff at

each location work part-time hours, resulting in many different people managing the front desk. This leads to communication gaps among the graduate student and the clubs on goals and procedures of the study, causing inconsistency and data loss. In the future, the researcher should attempt to meet with all members of staff prior to starting the study to explain the timeline, goals, and methods, as was conducted with the site director. It would also be helpful to provide a physical copy of a succinct summary of the study and methods attached to all data collection sheets and list of participants. This would provide the information to anyone managing the front counter each day and avoid confusion when the graduate student and volunteer observers arrived. The best time to implement interventions in partnership with the Boys and Girls Clubs of Southern Nevada would be during the week of spring break or summer vacation. At these times the clubs are open for longer hours, diminishing the limitation of time constraints, and clubs report having much higher and more consistent attendance.

Future evaluations of the SunWise Program should seek to improve the quality of the evidence on the effectiveness of the intervention through revising the questions for easier comprehension in youth and rewriting the questions to increase the data collection on future behaviors. Future studies that include similar populations to the current study may want to consider practicing, or enhancing the participants' ability to answer Likert scale questions before the implementation of the pre-test. A better option to increase sunsafe behaviors would be through use of visual aids such as posters displayed throughout the intervention locations. These would serve as reminders to participants to implement these important methods on a daily basis. When matching locations, it would be important not only to match using demographics, but also to

match based on the availability of shade at each location. Comparative opportunities for shade would aid in analysis of behavior observations. Natural alternatives to store bought sunscreen include ingredients such as shea butter and coconut oil. These alternatives should be shared with parents weary of using sunscreens infused with harsh chemicals or ingredients causing allergic reactions.

Best results on increasing knowledge, changing attitudes, and implementing sun safety into habit forming behaviors would be seen by repetition of this program throughout the year. The Boys and Girls Clubs and similar organizations would benefit the community and their population by continuing these efforts at least twice a year. It would be best if the school district complemented these efforts by including The SunWise Program in the classroom curriculum to instill the importance of sun safety in the student population. Involving parents in these presentations would also be an impactful method to spread education and change behaviors. This way the most complete information is disseminated through many levels and sun safety behavior implementation may be encouraged by the entire community.



## Chapter 7. Conclusions

The population residing in Clark County stands at high risk of skin damage from consistent high intensity UV radiation leading to significant sunburns. Sunburns are the main risk factor for developing skin cancer, currently the most commonly diagnosed cancer in the United States. Increasing knowledge through education of sunsafe information is an important preventative measure that should be implemented in multiple settings and repeated often. Many misconceptions surround the topic sun safety including lack of comprehension on how and when to apply sunscreen, which SPF level to utilize, the need for minority groups to implement sun safety practices, and the importance of prevention.

This study documented statistically significant increases in knowledge among youth in the intervention group in a very short time span. Education will combat these misconceptions to correct the misinformation currently abound. The intervention, using an interactive educational lesson, was free to implement and took only 20 minutes to complete. Repeating this intervention often and in multiple settings should act to eventually positively change attitudes toward implementing sunsafe behavior and positively impact behavior changes. Changing attitudes to associate tanned skin as damaged skin and inclination to seek shade and apply sunscreen did not show statistically significant results, but may be enhanced through repetition and providing easier access to shade and sunscreen. Behavior changes also did not show statistically significant results from before to after the intervention. These behaviors cannot be directly linked to the intervention as many external factors influence behavior changes. Participants did not bring hats to wear while outside, due to the fact that most schools in

the Clark County School District discourage youth from bringing hats, as it violates dress code policies while in the building. Cost of providing hats, sunglasses, and sunscreen at home may also deter this behavior change from taking place. Providing shade structures for youth to seek shade would also increase this behavior as many locations had little to no opportunity for shade.

The SunWise Program has been effective in providing comprehensive knowledge to participants and repetition of this program will proliferate this information eventually shifting the paradigm to make sun safety behavior a priority. Taking advantage of the SunWise Program's complete toolkit of resources would enhance results of this study. Based on the results of this study, the researcher recommends utilization of the SunWise Program with repetition spread throughout the year. A constant reminder of the importance of sun safety through this program has the potential to increase sun safe behaviors, ultimately preventing sunburns. Prevention methods for skin cancer in Clark County should be of high priority as Nevada's incidence is higher than the national average.

## Appendix A

Sunburns are the biggest risk factor developing skin cancer later in life!! (CDC, 2011)

To help complete this thesis project contact:

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# Live SunWise!!!

## Help increase Sun Safety in Southern Nevada youth!

**Elect your Boys and Girls Club location to help educate Las Vegas youth about the dangers of sunburns & the simple ways to protect your skin.**

Through "SunWise: Assessing the Impact in Clark County" students will be taught how to understand SPF, the UV index, the proper way to use sunscreen, & the dangers of sunburns. During the interactive lesson students will learn simple & easy to implement sunburn prevention methods.



Hat



Clothes



Shade



Sun Glasses



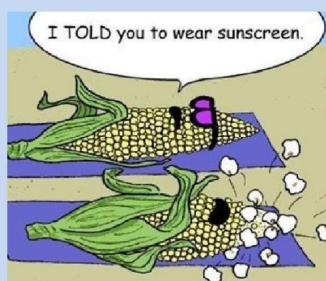
Sun Block

SunWise behaviors include wearing covered clothing, sunglasses, hats, correctly using sunscreen, and seeking shade while outside.

This study aims to increase education of sun safety and to increase sunsafe behaviors of students in Southern Nevada in order to impact the growing number of skin cancer incidences by focusing on preventing its main risk factor, sun burns.

The study will involve the following:

- ✚ Pretest and observation of students for SunWise behavior
- ✚ SunWise Presentation with interactive games to teach students how to be SunWise
- ✚ Posttest and observation of students for SunWise behavior
- ✚ Provision of sunscreen onsite and data collection on usage of sunscreen



Skin Cancer is more commonly diagnosed in the United States than breast, colon, & lung cancer combined!! (CDC, 2011)

Sunburns are the biggest risk factor in developing skin cancer later in life!! (CDC, 2011)

**Live SunWise!!!**

### Engage your child to live SUNWISE!

This is a very simple, but also very urgent educational program by the Environmental Protection Agency, which teaches children about the dangers of sunburns and the easy ways to protect your skin.

**WHY** join this important program?

Through "SunWise: Assessing the Impact in Clark County" students will be taught:

- ❖ how to understand SPF
- ❖ how to understand the UV index
- ❖ the proper way to use sunscreen
- ❖ the dangers of sunburns

**WHAT** are SunWise behaviors?

Wearing covered clothing, sunglasses, hats, correctly using sunscreen, and seeking shade while outside.



Hat



Clothes



Shade



Sun Glasses



Sun Block

**WHEN;** The next four weeks!

**PLEASE make sure your child attends this**

**Boys and Girls Club Location daily for the next 4 weeks!!!**

- ❖ **Certificates** awarded to those children who complete this educational program!!!!
- ❖ **Prizes** will be awarded to students with 90% attendance!!!!

**HOW** will this work? This study will involve the following:

- ❖ Pretest and observation of students for SunWise behavior!
- ❖ SunWise Presentation with interactive games to teach students how to be SunWise!
- ❖ Posttest and observation of students for SunWise behavior!
- ❖ Provision of sunscreen onsite and data collection on usage of sunscreen!



Skin Cancer is more commonly diagnosed in the United States than breast, colon, & lung cancer combined!! (CDC, 2011)

## Appendix B (Cont.)

Las quemaduras de sol son el mayor factor de riesgo en el desarrollo de cáncer de piel en el futuro!  
(CDC, 2011)

# Vivir SunWise!!!

### Involucrar a su hijo a vivir SUNWISE!

Se trata de un programa educativo muy simple, pero también muy urgente por parte de la Agencia de Protección del Medio Ambiente, que enseña a conducta investigación con los niños sobre los peligros de quemaduras por el sol y las maneras fáciles de proteger su piel.

**POR QUÉ** unirse a este importante programa?

A través de "SunWise: Evaluación del impacto en el condado de Clark" se les enseñará:

- ❖ cómo entender SPF
- ❖ cómo entender el índice UV
- ❖ la forma correcta de usar protector solar
- ❖ los peligros de quemaduras de sol

**¿QUÉ** son comportamientos SunWise ?

El uso de cubiertas de ropa , gafas de sol, sombreros, correctamente usando protectores solares y buscar la sombra mientras afuera.



Hat   Clothes   Shade   Sun Glasses   Sun Block

**CUANDO;** Los siguientes cuatro semanas!

**Asegúrese de que su hijo asista a esta ubicación en Boys and Girls Club al día durante los próximos 4 semanas!!!**

**Los premios** otorgados a los niños que completen este programa educativo!!!!

- ❖ Cada niño será capaz de hacer un color cambiante UV pulsera
- ❖ Amplio espectro SPF 30 de protección solar "SPF Rx" estará para cada niño a utilizar en el sitio

**CÓMO** ¿esto funcionara? Este estudio incluirá la siguiente:

- ❖ Encuesta previa y la observación de los estudiantes para el comportamiento sunwise!
- ❖ Sunwise Presentación con juegos interactivos para enseñar a los estudiantes cómo | pueden protegerse del sol!
- ❖ Misma encuesta y la observación de los estudiantes para el comportamiento sunwise!
- ❖ Dar protector solar en el lugar y medir la frecuencia con que se usa!

¡TE DIJE que usar protector solar!



El cáncer de piel se diagnostica con mayor frecuencia en los Estados Unidos de mama, de colon, de pulmón y cáncer de combinarse!  
(CDC, 2011)



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Conducting research under Principal Investigator:  
Dr. Courtney **GRANDJEAN**

## SunWise: Assessing the Impact in Clark County

Hello! I am working with the Boys and Girls Club of Southern Nevada to conduct my thesis project for my Master's in Public Health program at the UNLV Graduate College. This study, named SunWise: Assessing the Impact in Clark County, is an educational program aiming to increase sun safety education and protective behaviors by children in Southern Nevada by focusing on preventing skin cancer's main risk factor, sun burns. I hope to show that this increase is due to the presentation to encourage more community centers and schools to use this important resource as this is a serious concern for Southern Nevada. |

Skin Cancer is more commonly diagnosed in the United States than breast, colon, & lung cancer combined (CDC, 2011). Sunburns are the biggest risk factor in developing skin cancer later in life. This potentially fatal disease affects a growing number of people as shown by its high prevalence rate, with about 3.2 fatalities from skin cancer melanomas per 100,000 people in Nevada (CDC, 2011) and 2.9 per 100,000 people in the United States (CDC, 2011). The best way to prevent skin cancer is to habitually use sun safe behavior to prevent sunburns. Children are at the highest risk for developing sunburns because they are outside during peak high intensity UV ray hours during school as well as during after school programs. Our community must put in effort to raise awareness about being safe in the sun, and preventing sunburns to bring down these huge rates of skin cancer in our population.

The methods for this study involve observation, education, and short surveys following the timeline outlined on the following page. Participants will be observed by the graduate student's volunteers while outdoors to mark how many children are implementing sunsafe behaviors such as wearing hats, sunglasses, or seeking shade to play in while outside. Observers are trained in using methods based off of the System for Observing Play and Leisure Time Activity in Youth protocol developed to monitor child activity. These volunteers are all certified in research with human subjects by the Collaborative Institute Training Initiative Program. Observations will take place 2 days a week for two weeks prior to the SunWise presentation as well as 2 days a week for two weeks after the sun safety presentation. Education using the SunWise presentation will teach children how and why to be safe in the sun using a PowerPoint and activities. Participants will be asked to answer a few survey questions in the first week of the study and then answer the same questions once more in the third week of the study to see if they learned anything about being safe in the sun. Club members will be given SPF 30 broadband sunscreen by the SPF Rx brand at each location and the usage will be measured throughout the study.

## Appendix B (Cont.)

**Research Question:** Will teaching children about the risk of sunburns leading to skin cancer and teaching them how to prevent sunburns help them change their behavior to implement sun safety practices?

### **Timeline:**

1. Week 1!
  - a. Introduce club members to the study
  - b. Gain participant permission, and keep student information anonymous
  - c. Provide sunscreen for children to use at will
  - d. Give survey at all 6 locations
  - e. Observe participants during outdoor recess marking unsafe behavior for 2 days
2. Week 2!
  - a. Observe participants at all 6 locations during outdoor recess marking unsafe behavior for 2 days
3. Week 3!
  - a. Present SunWise PowerPoint at 4 intervention locations
    - ❖ Demonstrate proper sunscreen application
    - ❖ Manage games and hands on engaging activities with participating students
    - ❖ Participants gain knowledge and make their own color changing bracelets
  - b. Observe participants at all 6 locations during outdoor recess marking unsafe behavior for 2 days
4. Week 4!
  - a. Give survey once more at all 6 locations
  - b. Observe participants at all 6 locations during outdoor recess marking unsafe behavior for 2 days
  - c. Present SunWise PowerPoint at remaining 2 control locations
    - ❖ Demonstrate proper sunscreen application
    - ❖ Manage games and hands on engaging activities with participating students
    - ❖ Participants gain knowledge and make their own color changing bracelets
  - d. End of study, thank you!

PLEASE make sure your child attends this Boys and Girls Club Location daily for the next 4 weeks as it is imperative for success in this educational program!!!

If you have any questions or need any clarifications, please feel free to contact me at the information above at any time! Thank you so much for your time.



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Dr. Courtney Coughenour

## SunWise: Evaluación del impacto en el Clark County

¡Hola! Estoy trabajando con el Club de Niños y Niñas del Sur de Nevada para llevar a cabo mi proyecto de tesis para mi maestría en el programa de Salud Pública de la Universidad de Las Vegas de la universidad. Este estudio, llamado SunWise: Evaluación del impacto en el condado de Clark, es un programa educativo con el objetivo de aumentar la educación en seguridad sol y conductas de protección de los niños en el sur de Nevada, centrándose en la prevención de los factores de riesgo principal de cáncer de piel, quemaduras de sol. Espero demostrar que este aumento se debe a la presentación para animar a más centros comunitarios y escuelas para utilizar este recurso importante, ya que es una seria preocupación para el sur de Nevada.

El cáncer de piel se diagnostica con mayor frecuencia en los Estados Unidos de mama, colon, y cáncer de pulmón combinado (CDC, 2011). Las quemaduras de sol son el mayor factor de riesgo en el desarrollo de cáncer de piel en el futuro. Esta enfermedad potencialmente fatal afecta a un número creciente de personas, como se muestra por su alta tasa de prevalencia, con cerca de 3,2 muertes por melanoma cáncer de piel por cada 100.000 personas en Nevada (CDC, 2011) y 2,9 por cada 100.000 personas en los Estados Unidos (CDC, 2011). La mejor manera de prevenir el cáncer de piel es utilizar de manera habitual sol comportamiento seguro para prevenir las quemaduras solares. Los niños están en mayor riesgo de desarrollar quemaduras solares, ya que son al aire libre durante las horas pico de alta intensidad de rayos UV durante la escuela, así como durante los programas después de la escuela. Nuestra comunidad debe hacer un esfuerzo para aumentar la conciencia acerca de estar seguro en el sol, y la prevención de las quemaduras solares para reducir estos enormes tasas de cáncer de piel en nuestra población.

Los métodos de este estudio involucra la observación, la educación y encuestas cortas a partir de la línea de tiempo se indica en la página siguiente. Los participantes serán observados por los voluntarios de los estudiantes de licenciatura, mientras que al aire libre marcan cuántos niños están poniendo en práctica comportamientos sunsafe tales como el uso de sombreros, gafas de sol, o buscar la sombra para jugar en mientras que fuera. Los observadores están capacitados en el uso de métodos basados fuera del sistema de observación de juego y ocio Tiempo Actividad en el protocolo para jóvenes desarrollado para monitorear la actividad del niño. Estos voluntarios están certificados en la investigación con sujetos humanos por parte del Programa de Iniciativa para la Formación Instituto de Colaboración. Las observaciones se llevarán a cabo 2 días a la semana durante dos semanas antes de la presentación de SunWise, así como 2 días a la semana durante dos semanas después de la presentación sobre seguridad sol. Educación mediante la presentación SunWise va a enseñar a los niños cómo y por qué estar a salvo en el sol mediante un PowerPoint y actividades. Se les pedirá a los participantes a responder a algunas preguntas de la encuesta en la primera semana del estudio y luego responder las mismas preguntas una vez más en la tercera semana del estudio para ver si han aprendido nada de ser seguro en el sol. Los miembros del club se les dará SPF 30 de protección solar de banda ancha por la marca SPF Rx en cada ubicación y el uso se medirán durante todo el estudio.



## Appendix B (Cont.)

**Pregunta de investigación:** ¿Se enseñar a los niños sobre el riesgo de quemaduras solares que conducen a cáncer de piel y enseñándoles cómo prevenir las quemaduras de sol ayudan a cambiar su comportamiento para implementar prácticas de protección solar?

### **Línea de tiempo:**

1. Semana 1!
  - a. Presentar a los miembros del club para el estudio
  - b. Obtener el permiso de los participantes , y mantener la información del estudiante anónimo
  - c. Proporcionar protección solar para los niños a usar a voluntad
  - d. Dar encuesta a los 6 lugares
  - e. Observe a los participantes durante el recreo al aire libre que marcan el comportamiento sunsafe durante 2 días
2. Semana 2!
  - a. Observe a los participantes durante el recreo al aire libre que marcan el comportamiento sunsafe durante 2 días
3. Semana 3!
  - a. Presente PowerPoint de SunWise en 4 lugares de intervención
    - o Demostrar la aplicación de bronceador adecuado
    - o Manejo de juegos y actividades prácticas de acoplamiento con los estudiantes que participan
    - o Los participantes adquieren conocimientos y tomar sus propias pulseras de cambio de color
  - b. Observe a los participantes durante el recreo al aire libre que marcan el comportamiento sunsafe durante 2 días
4. Semana 4!
  - a. Dar encuesta una vez más en los 6 lugares
  - b. Observe a los participantes durante el recreo al aire libre que marcan el comportamiento sunsafe durante 2 días
  - c. Presente PowerPoint de SunWise en 2 lugares de intervención
    - o Demostrar la aplicación de bronceador adecuado
    - o Manejo de juegos y actividades prácticas de acoplamiento con los estudiantes que participan
    - o Los participantes adquieren conocimientos y tomar sus propias pulseras de cambio de color
  - d. Al final del estudio, gracias!!

¡Asegúrese de que su hijo asista a esta ubicación en Boys and Girls Club al día durante los próximos 4 semanas, ya que es imprescindible para el éxito de este programa educativo!!!

¡Si usted tiene alguna pregunta o necesita cualquier aclaración, no dude en ponerse en contacto conmigo en la información anterior, en cualquier momento! Muchísimas gracias por su tiempo.

**PARENT PERMISSION FORM**



**School of Community Health Sciences, Dept. of Environmental and Occupational Health**

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**TITLE OF STUDY:** SunWise: Assessing the Impact in 6 Boys & Girls Clubs of Southern Nevada

**INVESTIGATOR(S):** Sabina Malik, Courtney Coughenour

**CONTACT PHONE NUMBER:** 702-273-6908 or 702-895-4278

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**Purpose of the Study**

Your child is invited to participate in a research study. The purpose of this study is increase education on the risks associated with sunburns and determine how effective this education is on increasing sun safe behaviors.

**Participants**

Your child is being asked to participate in the study because they are in the age group at the highest risk for developing sunburns as they are outside during peak sun intensity, from 10am to 4pm. All students, ages 7 to 18 years old, at this Boys and Girls Club location have been asked to participate.

**Procedures**

If you allow your child to volunteer to participate in this study, your child will be asked to do the following: Take a pre-test measuring knowledge on sun safe behavior. Participate in a 45 minute science lesson (developed by the U.S. Environmental Protection Agency) that educates she/he on the risks associated with sunburns and on how to protect themselves from sunburns. Researchers from UNLV will conduct 4 days of observation during outside time to observe if students are using sun safe behavior such as wearing hats, sunglasses, covered clothing, using sunscreen, and finding

shade to play in. Take a post-test on gained knowledge after the lesson. Each participating Boys and Girls Club location will be provided with SPF 30 broadband sunscreen by the SPF Rx brand and made available for your child to use for free as your child would find it appropriate.

### **Benefits of Participation**

There may be direct benefits to your child as a participant in this study; they will learn how to protect themselves from harmful sun behaviors. We hope to learn if using the Environmental Protection Agency's SunWise program to teach your child about simple methods of sunburn prevention and the dangers of sunburns will encourage them to change their behavior and be safer in the sun.

### **Risks of Participation**

Appendix B (Cont.)

There are risks involved in all research studies. This study may include only minimal risks. The risks include any feelings your child may have when participating in a science lesson and taking a science test.

### **Cost /Compensation**

There will not be financial cost to you to participate in this study. The study will take about an hour and five minutes of your child's time (including a pretest, 45 minute science lesson and a posttest), along with 4 days of observation during outside time to observe if students are using sun safe behavior such as wearing hats, sunglasses, covered clothing, using sunscreen, and finding shade to play in. Your child will not be compensated for their time, but they will receive color changing bracelets/ keychains.

### **Contact Information**

If you or your child have any questions or concerns about the study, you may contact Sabina Malik at 702-273-6908 or Courtney Coughenour at 702-895-4278. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794, or via email at IRB@unlv.edu.**

## Voluntary Participation

Your child's participation in this study is voluntary. Your child may refuse to participate in this study or in any part of this study. Your child may withdraw at any time without prejudice to your relations with the university. You or your child is encouraged to ask questions about this study at the beginning or any time during the research study.

## Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link your child to this study. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be shredded.

## Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

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Signature of Parent  
(print)

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Child's Name (Please

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Parent Name (Please Print)

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Date

Appendix B (Cont.)



# FORMULARIO DE PERMISO DE LOS PADRES INTERVENCIÓN

## Departamento de Medio Ambiente y Salud Ocupacional

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**TÍTULO DEL ESTUDIO:** Evaluación del Impacto en 6 Boys & Girls Clubs de Southern Nevada

**INVESTIGADOR(S):** Dr. Courtney Coughenour, Sabina Malik, MPH Candidato

**TELÉFONO DE CONTACTO:** 702-273-6908 or 702-895-4278

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### **Propósito del estudio**

Se invita a su hijo a participar en un estudio de investigación. El propósito de este estudio es el de enseñar a los estudiantes sobre la necesidad de seguridad del sol.

### **Los Participantes**

Se le pide a su hijo a participar en el estudio, ya que están en el grupo de edad en el más alto riesgo de desarrollar quemaduras solares, durante la hora pico de la intensidad UV, de 10 a 4 pm. Estos estudiantes están en una edad joven, las edades de 7 a 18 años de edad, donde el aprendizaje de estos consejos ahora le ayudará a construir hábitos que les ayudaran a evitar quemaduras solares durante toda su vida.

### **Procedimientos**

Si usted permite que su hijo sea voluntario para participar en este estudio, su hijo se le pedirá que haga lo siguiente: Asistir a una breve presentación y participar en actividades durante la clase para aprender a reconocer las quemaduras de sol, los riesgos de las quemaduras solares y formas sencillas de evitar quemaduras de sol. Se le pedirá a su hijo a responder a las preguntas en una breve encuesta antes y después de la presentación. Su hijo será observado en el recreo para anotar cualquier comportamiento seguro sol notado como la búsqueda de sombra y llevando sombreros. Cada participante de Boys and Girls Club contará con SPF 30 de protección solar de

banda ancha por la marca SPF Rx para su hijo a usar como su hijo le resultaría apropiado.

### **Beneficios de la Participación**

Puede haber beneficios directos a su hijo como participante en este estudio. Esperamos saber si la enseñanza de su hijo acerca de métodos simples de prevención de quemaduras solares y los peligros de quemaduras animen a cambiar su comportamiento y ser más seguro en el sol.

### **Riesgos de la Participación**

Appendix B (Cont.)

Hay riesgos involucrados en todos los estudios de investigación. Este estudio incluye riesgos mínimos. Ellos pueden experimentar una ligera molestia en el aprendizaje de cómo el sol puede causar daños a su piel, y las precauciones necesarias que deben tomar cuando están expuestos al sol.

### **Costo / Compensación**

No habrá costo financiero para que usted participe en este estudio. El estudio tomara 45 minutos de tiempo de su hijo durante el programa educativo para completar la presentación, y 20 minutos para responder a las dos encuestas, junto con 4 días de observación durante el recreo para ver si los estudiantes están utilizando el comportamiento de prevención de seguridad del sol, como el uso de sombreros, gafas de sol, ropa protectora, el uso de crema protectora y la búsqueda de sombra para jugar. Su hijo será compensado por su tiempo con una pulsera que cambia de colores o llaveros.

### **Información del contacto**

Si usted o su hijo tiene preguntas o inquietudes sobre el estudio, puede comunicarse con Sabina Malik al 702-273-6908. Si tienes preguntas sobre los derechos de los sujetos de investigación, cualquier queja o comentario sobre la forma en que se está realizando el estudio puede comunicarse con el **UNLV Office of Research Integrity – Human Subjects** a 702-895-2794, número gratuito 877-895-2794, o por correo electrónico a [IRB@unlv.edu](mailto:IRB@unlv.edu).

## Participación Voluntaria

La participación de su hijo en este estudio es voluntaria. Su hijo puede negarse a participar en este estudio o en cualquier parte de este estudio. Su hijo puede retirarse en cualquier momento y sin perjuicio de sus relaciones con la universidad. Usted o su hijo puede hacer preguntas acerca de este estudio en el inicio o en cualquier momento durante el estudio de investigación.

## Confidentiality

Toda la información obtenida durante el estudio será completamente confidencial. No se hará materiales de referencias en escrito u orales que puedan enlazar a su hijo con este estudio. Todos los archivos serán guardados bajo llave en las facilidades de UNLV por 3 años después de que se complete el estudio.

## Participante Consentimiento:

He leído la información anterior y estoy de acuerdo en participar en este estudio. Tengo por lo menos 18 años de edad. He recibido una copia de esta forma.

\_\_\_\_\_  
Firma del padre  
favor imprimir)

\_\_\_\_\_  
Nombre del Niño (Por

\_\_\_\_\_  
Nombre del padre (letra de imprenta)

\_\_\_\_\_  
Fecha



Appendix B (Cont.)

# UNLV

# PARENT PERMISSION FORM CONTROL LOCATION

School of Community Health Sciences, Dept. of Environmental and Occupational  
Health

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**TITLE OF STUDY:** SunWise: Assessing the Impact in 6 Boys & Girls Clubs of Southern Nevada

**INVESTIGATOR(S):** Sabina Malik, Courtney Coughenour

**CONTACT PHONE NUMBER:** 702-273-6908 or 702-895-4278

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## **Purpose of the Study**

Your child is invited to participate in a research study. The purpose of this study is increase education on the risks associated with sunburns and determine how effective this education is on increasing sun safe behaviors

## **Participants**

Your child is being asked to participate in the study because they are in the age group at the highest risk for developing sunburns as they are outside during peak sun intensity, from 10am to 4pm. All students, ages 7 to 18 years old, at this Boys and Girls Club location have been asked to participate.

## **Procedures**

If you allow your child to volunteer to participate in this study, your child will be asked to do the following: Your child will be asked to take a short survey related to sun safe behaviors twice over the course of a month. Researchers from UNLV will conduct 4 days of observation during outside time to observe if students are using sun safe behavior such as wearing hats, sunglasses, covered clothing, using sunscreen, and finding shade to play in. Each participating Boys and Girls Club location will be provided with SPF 30 broadband sunscreen by the SPF Rx brand and made available for your child to use for free as your child would find it appropriate.



### **Benefits of Participation**

There may not be direct benefits to your child as a participant in this study. We hope to learn whether using the Environmental Protection Agency's SunWise program to teach children about simple methods of sunburn prevention and the dangers of sunburns will encourage them to change their behavior and be safer in the sun.

### **Risks of Participation**

Appendix B (Cont.)

There are risks involved in all research studies. This study may include only minimal risks. The risks include any feelings your child may have when participating in a science lesson and taking a science test.

### **Cost /Compensation**

There will not be financial cost to you to participate in this study. The study will take about 20 minutes of your child's time to complete both of the surveys, along with 4 days of observation during recess to see if students are using sun safe behavior such as wearing hats, sunglasses, covered clothing, using sunscreen, and finding shade to play in. Your child will not be compensated for their time, but they will receive color changing bracelets/ keychains.

### **Contact Information**

If you or your child have any questions or concerns about the study, you may contact Sabina Malik at 702-273-6908 or Courtney Coughenour at 702-895-4278. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794, or via email at IRB@unlv.edu.**

### **Voluntary Participation**

Your child's participation in this study is voluntary. Your child may refuse to participate in this study or in any part of this study. Your child may withdraw at any time without prejudice to your relations with the university. You or your child is encouraged to ask questions about this study at the beginning or any time during the research study.

## Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link your child to this study. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be shredded and deleted.

## Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

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Signature of Parent  
(print)

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Child's Name (Please

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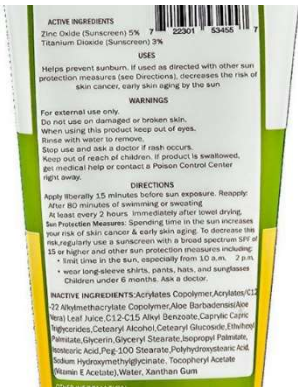
Parent Name (Please Print)

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Date

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## FORMULARIO DE PERMISO DE LOS PADRES CONTROL

Departamento de Medio Ambiente y Salud Ocupacional

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**TÍTULO DEL ESTUDIO:** Evaluación del Impacto en 6 Boys & Girls Clubs de Southern Nevada

**INVESTIGADOR(S):** Dr. Courtney Coughenour, Sabina Malik, MPH Candidato

**TELÉFONO DE CONTACTO:** 702-273-6908 or 702-895-4278

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### **Propósito del estudio**

Se invita a su hijo a participar en un estudio de investigación. El propósito de este estudio es el de enseñar a los estudiantes sobre la necesidad de seguridad del sol.

### **Los Participantes**

Se le pide a su hijo a participar en el estudio, ya que están en el grupo de edad en el más alto riesgo de desarrollar quemaduras solares, durante la hora pico de la intensidad UV, de 10 a 4 pm. Estos estudiantes están en una edad joven, las edades de 7 a 18 años de edad, donde el aprendizaje de estos consejos ahora-le ayudará a construir hábitos que les ayudaran a evitar quemaduras solares durante toda su vida.

### **Procedimientos**

Si usted permite que su hijo sea voluntario para participar en este estudio, su hijo se le pedirá que haga lo siguiente: Responder a las preguntas en una breve encuesta antes y después de la investigación como reconocer las quemaduras de sol, los riesgos de

las quemaduras solares y formas sencillas de evitar quemaduras de sol. Su hijo será observado en el recreo para anotar cualquier comportamiento seguro sol notado como la búsqueda de sombra y llevando sombreros. Cada participante de Boys and Girls Club contará con SPF 30 de protección solar de banda ancha por la marca SPF Rx para su hijo a usar como su hijo le resultaría apropiado.

### **Beneficios de la Participación**

Puede haber beneficios directos a su hijo como participante en este estudio. Esperamos saber si la enseñanza de su hijo acerca de métodos simples de prevención de quemaduras solares y los peligros de quemaduras animen a cambiar su comportamiento y ser más seguro en el sol.

### **Riesgos de la Participación**

Hay riesgos involucrados en todos los estudios de investigación. Este estudio incluye riesgos mínimos. Ellos pueden experimentar una ligera molestia en el aprendizaje de cómo el sol puede

Appendix B (Cont.)

causar daños a su piel, y las precauciones necesarias que deben tomar cuando están expuestos al sol.

### **Costo / Compensación**

No habrá costo financiero para que usted participe en este estudio. El estudio tomara 45 minutos de tiempo de su hijo durante el programa educativo para completar la presentación, y 20 minutos para responder a las dos encuestas, junto con 4 días de observación durante el recreo para ver si los estudiantes están utilizando el comportamiento de prevención de seguridad del sol, como el uso de sombreros, gafas de sol, ropa protectora, el uso de crema protectora y la búsqueda de sombra para jugar. Su hijo será compensado por su tiempo con una pulsera que cambia de colores o llaveros.

### **Información del contacto**

Si usted o su hijo tiene preguntas o inquietudes sobre el estudio, puede comunicarse con Sabina Malik al 702-273-6908. Si tienes preguntas sobre los derechos de los sujetos de investigación, cualquier queja o comentario sobre la forma en que se está realizando el estudio puede comunicarse con el **UNLV Office of Research Integrity** –

Human Subjects a 702-895-2794, número gratuito 877-895-2794, o por correo electrónico a IRB@unlv.edu.

## Participación Voluntaria

La participación de su hijo en este estudio es voluntaria. Su hijo puede negarse a participar en este estudio o en cualquier parte de este estudio. Su hijo puede retirarse en cualquier momento y sin perjuicio de sus relaciones con la universidad. Usted o su hijo puede hacer preguntas acerca de este estudio en el inicio o en cualquier momento durante el estudio de investigación.

## Confidentiality

Toda la información obtenida durante el estudio será completamente confidencial. No se hará materiales de referencias en escrito u orales que puedan enlazar a su hijo con este estudio. Todos los archivos serán guardados bajo llave en las facilidades de UNLV por 3 años después de que se complete el estudio.

## Participante Consentimiento:

He leído la información anterior y estoy de acuerdo en participar en este estudio. Tengo por lo menos 18 años de edad. He recibido una copia de esta forma.

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Firma del padre  
favor imprimir)

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Nombre del Niño (Por

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Nombre del padre (letra de imprenta)

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Fecha



## Appendix C



### ASSENT TO PARTICIPATE IN RESEARCH

## **Sunwise: Assessing the Impact in 6 Boys & Girls Clubs of Southern Nevada**

1. My name is Sabina Malik, Ms. Malik.
2. We are asking you to take part in a research study because we are trying to learn more about what kids know about being safe in the sun.
3. If you agree to be in this study you will answer 30 questions on what you already know about sunburns and being safe in the sun. I want to see if speaking to you about this helps you to protect yourself from sunburns when you are outside. Then you will answer the same questions a few weeks later so we can see if this lesson helped you learn about sun safety.
4. The only risk you will experience is the feeling you get when you take a test.
5. After this study you will know how to protect yourself better from sunburns.
6. Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still decide not to do this.
7. If you don't want to be in this study, you don't have to participate. Remember, being in this study is up to you and no one will be upset if you don't want to participate or even if you change your mind later and want to stop.
8. You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me at 702-273-6908 or ask me next time. If I have not answered your

questions or you do not feel comfortable talking to me about your question, you or your parent can call the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794.

9. Signing your name at the bottom means that you agree to be in this study. You and your parents will be given a copy of this form after you have signed it.

---

Print your name

---

Date

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Sign your name



**CONSENTIMIENTO PARA PARTICIPAR EN LA INVESTIGACIÓN**

**SunWise: Assessing the Impact in 6 Boys & Girls Clubs of Southern Nevada**

1. Mi nombre es Sabina Malik, Ms. Malik.
2. Le estamos pidiendo su participación en un estudio de investigación porque estamos tratando de aprender más acerca de cómo protegernos contra los rayos dañinos del sol.
3. Si acepta participar en este estudio va a responder a 30 preguntas sobre lo que ya sabe sobre quemaduras del sol y estar a salvo en el sol. Quiero ver si hablar con usted acerca de esto le ayuda a protegerse de las quemaduras de sol cuando está fuera. A continuación, se le contestarán las mismas preguntas unas semanas más tarde para que podamos ver si esta lección ayudó a aprender acerca de la seguridad del sol.
4. Es posible que usted experimente molestias mínimas mientras que aprende sobre los riesgos de quemaduras solares en desarrollo.
5. Usted aprenderá cómo protegerse de cualquier peligro de los rayos UV del sol, aprenderá a mantenerse alejado de riesgos que causan quemaduras dolorosas, y a protegerse y prevenir en el futuro enfermedades de la piel causadas por los rayos UV en la actualidad.
6. Por favor, hable de esto con sus padres antes de decidir si participar o no. También pediremos a sus padres su autorización para que usted tome parte en este estudio y aunque sus padres autoricen su participación, usted todavía puede decir que no.
7. Si usted no quiere estar en este estudio, no tiene que participar. Recuerde, en este estudio depende de usted y nadie se molestará si usted no desea participar o incluso si cambia de opinión más tarde y quiere dejar de participar.



8. Puede hacer cualquier pregunta que usted tenga sobre el estudio. Si después usted tiene una pregunta que no pensó ahora, usted puede llamarme al 702-273-6908 o preguntarme la próxima vez. Usted me puede enviar un correo electrónico en cualquier momento con sus preguntas al malik.sabina@gmail.com. Si no contesto a sus preguntas o no se siente cómodo hablando conmigo sobre su preguntas, usted o sus padres pueden comunicarse ala oficina de UNLV Office of Research Integrity – Human Subjects al 702-895-2794 o al numero gratuito 877-895-2794.
  
9. Su firma en la parte inferior significa que usted está de acuerdo en participar en este estudio. A usted y sus padres se les entregará una copia de este formulario después de haber firmado.

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Escriba su nombre

---

Fecha

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Firma con tu nombre

Appendix C (Cont.)



**ASSENT TO PARTICIPATE IN RESEARCH**

**Sunwise: Assessing the Impact in 6 Boys & Girls Clubs of Southern Nevada**

1. My name is Sabina Malik, Ms. Malik.
  
2. We are asking you to take part in a research study because we are trying to learn more about what kids know about being safe in the sun.

3. If you agree to be in this study you will answer 30 questions on what you already know about sunburns and being safe in the sun. Then we will teach you a science lesson on how to behave safely in the sun. I want to see if teaching you about this helps you to protect yourself from sunburns when you are outside. Then you will answer the same questions so we can see if our science lesson helped you learn about sun safety. .
4. The only risk you will experience is the feeling you get when you take a test.
5. After this study you will know how to protect yourself better from sunburns.
6. Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say “yes” you can still decide not to do this.
7. If you don’t want to be in this study, you don’t have to participate. Remember, being in this study is up to you and no one will be upset if you don’t want to participate or even if you change your mind later and want to stop.
8. You can ask any questions that you have about the study. If you have a question later that you didn’t think of now, you can call me at 702-273-6908 or ask me next time. If I have not answered your questions or you do not feel comfortable talking to me about your question, you or your parent can call the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794.
9. Signing your name at the bottom means that you agree to be in this study. You and your parents will be given a copy of this form after you have signed it.

---

Print your name

---

Date

---

Sign your name



**CONSENTIMIENTO PARA PARTICIPAR EN LA INVESTIGACIÓN**

**SunWise: Assessing the Impact in 6  
Boys & Girls Clubs of Southern Nevada**

1. Mi nombre es Sabina Malik, Ms. Malik.
2. Le estamos pidiendo su participación en un estudio de investigación porque estamos tratando de aprender más acerca de cómo protegernos contra los rayos dañinos del sol.
3. Si acepta participar en este estudio usted aprenderá lo fácil que es protegerse del sol y cómo evitar quemaduras solares dolorosas. Va a responder a 30 preguntas sobre lo que ya sabe sobre quemaduras del sol y estar a salvo en el sol. A continuación te enseñaremos una lección de ciencias sobre cómo comportarse con seguridad en el sol. Quiero ver si la enseñanza de usted acerca de esto le ayuda a protegerse de las quemaduras de sol cuando está fuera. A continuación, se le contestar las mismas preguntas para que podamos ver si nuestra clase de ciencias ayudó a aprender acerca de la seguridad sol. a a responder a 30 preguntas sobre lo que ya sabe sobre quemaduras del sol y estar a salvo en el sol. A continuación te enseñaremos una lección de ciencias sobre cómo comportarse con seguridad en el sol. Quiero ver si la enseñanza de usted acerca de esto le ayuda a protegerse de las quemaduras de sol cuando está fuera. A continuación, se le contestar las mismas preguntas para que podamos ver si nuestra clase de ciencias ayudó a aprender acerca de la seguridad sol.
4. Es posible que usted experimente molestias mínimas mientras que aprende sobre los riesgos de quemaduras solares en desarrollo.
5. Usted aprenderá cómo protegerse de cualquier peligro de los rayos UV del sol, aprenderá a mantenerse alejados de riesgos que causan quemaduras dolorosas, y a protegerse y prevenir en el futuro enfermedades de la piel causadas los rayos UV en la actualidad

6. Por favor, hable de esto con sus padres antes de decidir si participar o no. También pediremos a sus padres su autorización para que usted tome parte en este estudio y aunque sus padres autoricen su participación, usted todavía puedes decir que no.
  
7. Si usted no quiere estar en este estudio, no tiene que participar. Recuerde, en este estudio depende de usted y nadie se molestará si usted no desea participar o incluso si cambia de opinión más tarde y quiere dejar de participar.
  
8. Puede hacer cualquier pregunta que usted tenga sobre el estudio. Si después usted tiene una pregunta que no pensó ahora, usted puede llamarme al 702-273-6908 o preguntarme la próxima vez. Usted me puede enviar un correo electrónico en cualquier momento con sus preguntas al malik.sabina@gmail.com. Si no contesto a sus preguntas o no se siente cómodo hablando conmigo sobre su preguntas, usted o sus padres pueden comunicarse a la oficina de UNLV Office of Research Integrity – Human Subjects al 702-895-2794 o al número gratuito 877-895-2794.

### Appendix C (Cont.)

9. Su firma en la parte inferior significa que usted está de acuerdo en participar en este estudio. A usted y sus padres se les entregará una copia de este formulario después de haber firmado.

---

Escriba su nombre


---

Fecha

---

Firma con tu nombre

Appendix D



**SunWise**  
a program that radiates good ideas


[www.epa.gov/sunwise](http://www.epa.gov/sunwise)

Grades 6-8



U.S. Environmental Protection Agency


## Be SunWise



## What do you know about the Sun?



## The Sun

Helpful	Harmful
Keeps Us Warm 	Causes Sunburns 
Helps Plants Grow 	Makes Our Skin Wrinkle 

## Helpful and Harmful Effects of Sunlight

Helpful	Harmful
Keeps Us Warm	Produces Suntan and Sunburn
Vitamin D Synthesis	Effects Our Immune System
Help Plants Grow	Causes Skin Cancer
Kills Germs	Photosensitivity
Makes Us Feel Good	Makes Your Skin Wrinkle
Provides Light To See By	Causes Eye Damage

## The Sun...

...is essential for life on Earth.

It helps plants to grow, and provides warmth and light.

Sunlight also helps people to be happy and healthy.




Appendix D (Cont.)


### The Sun...

...produces light and warmth but also Ultraviolet (UV) radiation. UV radiation cannot be seen or felt.

It is UV radiation, not the warmth or brightness of the sun that causes changes to skin color, damage to eyes, and other bad health effects.




### Can you recognize a sunburn?



### Why is this so important????

Getting a serious sunburn as a child increases RISK of developing skin cancer as an adult.

Do your part and prevent sunburns to lower your risk!



Skin Type Chart		
Skin Color	UV Sensitivity	Skin Cancer Risk
Very fair	Very high	Very high
Fair	High	High
Light	Medium-High	Medium-High
Medium	Medium	Medium
Dark	Low-Medium	Low-Medium
Very dark	Low	Low

www.sunwise.gov

### Sun Safe Behaviors




SunWise

### The Ozone Layer...

- \* ...is a thin shield high up in the sky. It protects life on Earth from the sun's ultraviolet (UV) rays.
- \* In the 1980s, scientists began finding the ozone being depleted allowing more UV radiation to reach the Earth's surface.
- \* The level of UV radiation that reaches the Earth's surface can vary, depending on a variety of factors.

### UV radiation levels vary depending on:

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





# UV Radiation

UV Radiation

## How do we measure UV radiation levels?

We use the UV Index Scale.  
Reported on a scale of 1 -11+.

*Take special care when the UV Index is 5-6 or higher.*

## The Burning Facts...

There is no such thing as a healthy suntan.

- UVA rays -premature Aging
- UVB rays -cause of sunburn
- Skin type affects the degree some people burn.
- Use Sunscreen with SPF of 15 or more.
- SPF 30 is NOT twice as protective as SPF 15.

## How Can You Become SunWise?

## Sun Safety Action Steps

Limit Time in the Midday Sun	Wear Sunglasses
Seek Shade	Use Sunscreen
Cover Up	Avoid Tanning Parlors
Wear a Hat	Watch for the UV Index



**Sun Safety Action Steps**



**Limit Time  
in the Midday  
Sun**

The sun's rays are strongest between 10 am and 4 pm.

To the extent possible, limit exposure to the sun during these hours.

**Sun Safety Action Steps**



**Seek Shade**

Staying under cover is one of the best ways to protect yourself from the sun.

But remember, shade structures do not offer complete sun protection.

**Sun Safety Action Steps**



**Cover Up**

Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from the sun's UV rays.

**Sun Safety Action Steps**



**Use Sunscreen**

Use sunscreen of SPF 15+ liberally and reapply every 2 hours, or after working, swimming, playing, or exercising outdoors.

**Sun Safety Action Steps**



**Wear a Hat**

A hat with a wide brim offers good sun protection for your eyes, ears, face, and the back of your neck.

**Sun Safety Action Steps**



**Wear Sunglasses**

Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage.


**Sun Safety Action Steps**



## Avoid Tanning Parlors

The light source from sunbeds and sunlamps damages the skin and unprotected eyes. It is a good idea to avoid artificial sources of UV light.

**Sun Safety Action Steps**



## Watch for the UV Index

The UV Index provides important information to help you plan your outdoor activities in ways that prevent overexposure to the sun. The UV Index is issued daily across the United States.

**Slip! Slop! Slap! Wrap!**

- Slip on a t-shirt
- Slop on some sun screen
- Slap on a hat
- Wrap around some sunglasses
- Search for shade






## Are You SunWise?




**True or False?**



**You can get sunburned on a cloudy day.**

**True or False?**





**You can get sunburned on a cloudy day.**

**TRUE** Even on an overcast day, 30 to 60 percent of the sun's rays can reach the Earth's surface.

**True or False?**

**You only need to wear sunscreen when you are at the beach.**

**True or False?**


**You only need to wear sunscreen when you are at the beach.**




**FALSE** You do not have to be actively sunbathing to get a damaging dose of the sun. Everyday exposure counts!




**True or False?**



**Sunscreen with a SPF of LESS than 15 is enough to protect my skin.**




**True or False?**




**Sunscreen with a SPF of LESS than 15 is enough to protect my skin.**


**FALSE** Use Sunscreen with **SPF 15 or Higher**. Remember, an ounce of prevention is worth a pound of cure.




**True or False?**



**My skin doesn't get sunburned, so I don't need to worry about protecting myself from overexposure to the sun.**



**True or False?**



**My skin doesn't get sunburned, so I don't need to worry about protecting myself from overexposure to the sun.**

**FALSE** Skin cancer and other bad effects from the sun can affect any person, regardless of skin color.





**SunWise**  
a program that **radiates** good ideas

[www.epa.gov/sunwise](http://www.epa.gov/sunwise)



*U.S. Environmental Protection Agency*



## Appendix E

We have a few questions we want you to answer about yourself and the sun. Thank you for answering these questions. Please use a pencil to fill in the circle for each answer you choose. If you want to change your answer choice, be sure to erase your first choice completely.

What month is it?

January  February  March  April  May  June  
 July  August  September  October  November  December

1. How old are you?  5  6  7  8  9  10  11  12  13  
 14

2. Are you a boy or a girl?  Boy  Girl

3. What is the color of your hair?  Blond  Red  Brown  Black

4. Does your skin burn easily in the sun?  Yes  No  I don't know

5. What are some of the ways you can keep your skin safe from the sun?

(Please fill in as many circles as you need to answer this question.)

Eating cereal  Using sunscreen  Listening to the radio  Wearing a shirt and hat outside

6. When do you have to use the most sun protection?

When the (Ultraviolet) UV Index is:  1  5  10 or higher  I don't know

7. You can get a sunburn on a cloudy day.       True       False
8. You only need to wear sunscreen when you are at the beach or pool.       True       False
9. Keeping your skin safe from the sun is:       Hard to do       Not too hard, not too easy       Easy to do

10. Some of the reasons why I do NOT wear sunscreen when I'm outside are because:

(Please fill in as many circles as you need to answer this question.)

- It takes too long to put on sunscreen.       It's hard to put sunscreen on my whole body.  
 I forget to put on sunscreen.       I don't have any sunscreen.  
 It stings my eyes.       I do wear sunscreen.

11. Some of the reasons why I do NOT wear a hat or shirt when I'm outside are because:

(Please fill in as many circles as you need to answer this question.)

- I forget to bring a hat.       I don't like to wear a hat.       I don't have a hat.  
 It's too hot to wear a long-sleeved shirt.       I do wear a shirt and hat.

12. Do you like to get a tan?       Yes       No

#### Appendix E (cont.)

13. Do you think people look healthier with a tan?       Yes       No

14. When you wear a bathing suit outside, what are **all** of the places that you put on sunscreen?  
(Please fill in as many circles as you need to answer this question.)

- My face
- My back
- My arms
- My ears
- My shoulders
- My stomach
- My legs
- I don't put it on

15. Do you talk to your family about putting on sunscreen or wearing a hat or shirt when you're out in the sun?       Yes       No

16. When you're out in the sun with your friends, do you talk to them about being sun safe?  
 Yes       No

17. Last summer, when the sun was out around lunchtime, how many days did you go outside each week?  
 0-1 day per week       2-3 days per week       4-5 days per week       6-7 days per week

18. Last summer, how many hours a day did you spend outdoors between 10 AM and 4 PM?  
 Less than 1 hour per day       1-2 hours per day       3-4 hours per day       5-6 hours per day

19. Last summer, how many hours a day did you spend at the beach or outdoor pool between 10 AM and 4 PM?  
 Less than 1 hour per day       1-2 hours per day       3-4 hours per day       5-6 hours per day

When you were outside in the sun last summer:

Never?	All of the time?	Sometimes?	
20. Did you wear a hat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Did you wear a long-sleeved shirt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Did you wear sunglasses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Did you wear sunscreen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. When you wore sunscreen, what number sunscreen or SPF (sun protection factor) did you use?

- less than 15     15-29     30 or higher     I don't know

25. How many times did you get sunburned last summer?

- None     One or two     Three or more

26. **If** you got a sunburn last summer, how many of the sunburns were painful?

- None     One or two     Three or more     I did not get sunburned

27. When you are outside in the sun, will you try to play in the shade instead of the sun?

Appendix E (Cont.)

- Yes     Most likely     Probably not     No

28. Will you put sunscreen on when you go out in the sun this summer?

- Yes     Most likely     Probably not     No

29. Does your school announce the UV Index?     Yes     No

30. Have you had a school lesson before on sun protection?     Yes     No



Appendix F



# UNLV

## SUNSCREEN MEASUREMENT FORM



Club Location: \_\_\_\_\_ Date (\_\_\_\_/\_\_\_\_/2016) Time \_\_\_\_:\_\_\_\_pm

Today's Estimated Number of Participants: \_\_\_\_\_ Observer \_\_\_\_\_

Today's Weather Conditions: \_\_\_\_\_

<p>Seeking Shade</p>	<p>Sunglasses</p>
<p>Total Tallies _____</p>	<p>Total Tallies _____</p>
<p>Covered Clothing</p>	<p>Wearing Hats</p>
<p>Total Tallies _____</p>	<p>Total Tallies _____</p>

## Appendix G

Locations	Pretests and Observations						Posttests at Intervention Sites and Observations				
	Fri 4/1	Mon 4/4	Tue 4/5	Wed 4/6	Thu 4/7	Fri 4/8	Mon 4/11	Tue 4/12	Wed 4/13	Thu 4/14	Fri 4/15
920 Cottage Grove Ave (Intervention)		Pretest Obs 1		Obs 2		Obs 3	Pretest +	Obs 4 PresPost	Obs 5		
2530 E. Carey Ave (Intervention)	Pretest				Obs 1		Obs 2	Obs 3	Obs 4	PresPost Obs 5	Obs 6
2850 Lindell Rd			Pretest Obs 1	Obs 2				Obs 3		Obs 4	
401 Drake St (Intervention)				Pretest Obs 1	Obs 2		Obs 3		Obs 4 PresPost	Obs 5	Obs 6
2980 Robindale Rd			Obs 1		Pretest Obs 2						Obs 3
2801 Stewart Ave					Obs 1	Pretest Obs 2		Obs 3	Obs 4	Obs 5	Pretest Obs 6

Locations	Remaining Pretests, Posttests, and Observations											
	Mon 4/18	Tue 4/19	Wed 4/20	Thu 4/21	Fri 4/22	Mon 4/25	Tue 4/26	Wed 4/27	Thu 4/28	Fri 4/29	Mon 5/02	Tue 5/03
920 Cottage Grove Ave (Intervention)		PresPost Obs 6	Obs 7					Obs 8				
2530 E. Carey Ave (Intervention)			Obs 7	PresPost Obs 8								
2850 Lindell Rd			Pretest + Obs 5				Obs 6 Post/Pre	Obs 7				Obs 8
401 Drake St (Intervention)				Obs 7		Posttest + Obs 8						
2980 Robindale Rd	Pretest +		Obs 4		Obs 5		Obs 6	Obs 7 PresPost				Obs 8
2801 Stewart Ave		Obs 7		Obs 8	Post/Pre setation							

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