

Parental Sunscreen Use: A Descriptive Study of Knowledge, Attitudes, and Behaviors Regarding Sun Protection in a Rural Population

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Abstract

The purpose of this study was to describe the relationship between parents' knowledge and attitudes about sunscreen use and their reported sunscreen use behaviors with their children, ages one to twelve, when playing outside and at the pool or beach in a rural and diverse population. Door-to-door surveys were conducted in randomly selected neighborhoods. Knowledge of doctors' minimum SPF recommendation was found to be significant in how often sunscreen was used outside and at the pool or beach. Knowledge of the sun's strongest hours was significantly related to how often sunscreen was used with children when at the pool or beach. Knowledge of consequences from a bad sunburn was found to be significant in how often sunscreen is used outside with children. Participants knowing that most of skin damage occurs prior to eighteen years old was significantly related to how often participants use sunscreen with children at the pool or beach. A weak positive correlation was found for seriousness of skin cancer. A weak negative correlation was found for remembering to use sunscreen, for difficulty remembering sunscreen and limited use due to cost. A weak positive correlation was found for increasing use leading to reduced cancer risk. Asians and Caucasians reported the highest sunscreen use. Knowing what knowledge and attitudinal factors lead to sunscreen use with parents is crucial to planning appropriate health education programs. Children are the most vulnerable population to skin damage and it is important that parents know how to properly protect them.

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Introduction

Skin cancer is one of the most preventable cancers, yet the incidence of melanoma is the fastest increasing type of cancer in the United States (U.S.) (Dennis, 2003). People who have darker skin and eye color are naturally more protected from the sun, but people with fair or light colored skin and eyes are at the greatest risk for developing skin cancer. This is because people with light colored skin and eyes have less protective skin pigmentation. All skin types have been studied in the past and a common theme found was that people are not applying and reapplying sunscreen properly or using other sun protective measures enough while outdoors (Robinson, 2000).

In the U.S., incidence rates of skin cancer are growing faster than any other type of cancer. Over 54,000 cases of melanoma were estimated

to occur and 7,600 estimated deaths were expected in 2003, within the U.S. (Dennis, 2003). In 2000, there were 382 skin cancer deaths in Pennsylvania, which is a tie with deaths in 1997 as the second highest annual number of deaths for the decade of 1991-2000. There was also over a 93% increase in the number of malignant melanoma cases diagnosed from 1991-2000 (PDOH, 2000). People with fair skin, blue eyes, and light colored hair are the people who are at most risk for developing skin cancer. This is due to the lack of protective skin pigmentation, thus more sunburns and skin damage can occur in this population.

One of the most vulnerable populations is children. It is estimated that up to 80 percent of skin damage from the sun occurs before a person is eighteen years old (Robinson, 2000). If adults are not aware of and do not use sun protection

measures effectively, such as sunscreen application, then presumably their children are not getting the protection that is imperative to their health.

Previous studies have explored parents' sunscreen use and how their attitudes and knowledge reflected on using sunscreen with their children (Cokkinides, 2004; Lescano, 1997; Robinson, 2000). These studies show that sunscreen is the most often used form of protection by parents for their children; however, the sunscreen often is not used properly. They also show that people in lower socio-economic levels are less likely to use sunscreen as compared to people in higher socio-economic levels (Lescano, 1997). These past studies all have limitations, such as the location of the study (on a Florida beach) or small representation of members in the lower socio-economic levels. This new study did not only target one setting, but all areas of a rural town and neighboring township in efforts to reach people of all socio-economic levels.

Concerns about Past Research

There has been debate in the past few years as to whether sunscreen use actually leads to or helps protect from melanoma. Some researchers report that past studies have been biased in saying that sunscreen use can lead to melanoma due to subject selection. Past participants have been those with fair skin with higher risks for skin cancer and are more likely to use sunscreen, giving a false relationship (Dennis, 2003). Also participants have used sunscreen to prolong time spent in the sun before developing a sunburn. With no reapplication, these people are prolonging exposure to the sun without sufficient protection, thus making themselves at higher risk for melanoma (Autier, 1999; Dennis, 2003). Another bias that has occurred in past research is that older studies involve sunscreens that were not as developed as the sunscreens available today, specifically, older sunscreens developed before 1989 did not protect against Ultraviolet A radiation, which has been linked to cutaneous malignant melanoma. Studies have also been deficient in controlling for sunscreen water resistance and sun protection factor (SPF) levels (Dennis, 2003). After reviewing these past

weaknesses in the research, current studies have found that sunscreen use is not associated with increased risk for melanoma (Dennis, 2003; Huncharek, 2002).

Problems with Sunscreen Use

A major problem with sunscreen use is the inadequate application by users. Previous studies have recorded poor compliance with recommendations of regular application and reapplication of sunscreen (Dennis, 2003; Taylor, 2004). When the SPF of a sunscreen is being tested, the protocol uses 2 mg/cm². This amount, approximately three grams for an adult or approximately equal to two finger lengths of sunscreen, is supposed to be applied to eleven areas on the body, each covering nine percent of body surface. However, it has been found that the amount that people usually apply to their bodies is equivalent to only one third of the SPF of the sunscreen used (Taylor, 2004). Many parts of the body are skipped when applying sunscreen, including ears, neck, feet, and legs (Robinson, 2000). There has even been speculation that sunscreen companies should change the label of the product to display what the tested SPF is and what the probable amount of protection is (one third of the tested SPF) (Taylor, 2004). This section will now look at sunscreen use and sun exposure among adults, in general, and of parents with young children.

In the U.S., approximately one quarter of White adults frequently sunbathe; however, only about one quarter of this population uses sunscreen at the recommended levels (Koh, 1997). Sun overexposure and sunscreen use are not only a problem in the U.S., but also in Australia, where the ozone layer is depleting and more harmful rays are reaching people. On this high risk continent, many people are reporting using both sunscreen and sunbathing. This shows that they perceive the sun as a risk high enough to use sunscreen, but are still purposefully exposing themselves to harmful rays. Researchers found a linear relationship between skin type and sun protection behaviors. Those people who burn the easiest (fair skin) reported the most sun protection behaviors, whereas those who only tan reported the least sun protection behaviors. A surprising finding shows that people who burn

first and then develop a tan a week later were similar in tanning behavior with those who tan only. This is putting the burn first, tan later group at high risk for skin cancer because they are still experiencing the harmful effects of the sunburn (Clarke, 1996).

Sunscreen Use and the Health Belief Model

Cognitive factors play an important role in sunscreen use. By changing someone's knowledge and perceptions, that person is more readily to change. In this case, if people have the correct knowledge and perceptions about sunscreen, they are more likely to use it, and use it properly. This is a perfect example of the Health Belief Model. According to Turrisi, et al., (1999) “. . . Sunscreen use could be improved by increasing the perceived health and appearance related risks associated with not using sunscreen, increasing the perceived need to use sunscreen, increasing the perceived efficacy of sunscreen use, and by increasing social pressure to increase sunscreen use.” It has been reported that people perceive sunscreen to be more important on sunny days versus cloudy days and on hotter days versus mild days. It is also widely reported that people of higher education levels and higher socio-economic levels are more likely to use sunscreen (Robinson, 2000).

Parents and Sunscreen Use

It is believed that up to 80% of skin damage is done before the age of eighteen. The most widely used sun protection for children by parents is the use of sunscreen (Robinson, 2000). Children whose parents frequently used sunscreen were thirty percent more likely to use sunscreen; however, as stated before, sunscreen is not being used nearly enough or properly by the majority of adults in the U.S. (Cokkinides, 2004). Parents play a major role in the sun safety of children, especially young children who have no other means of acquiring products such as sunscreen. In recognizing the importance of the parents' roles in children's sun protection, studies have looked at parents' knowledge, attitudes, and behaviors of sun protection.

A relationship has not been found between knowledge of skin cancer and sun protection

practices. Knowledge of skin cancer was seen as higher among parents of younger children as compared to parents of older children, but again, there was no difference in sun protection practices (Lescano, 1997).

Attitudes were also compared with sunscreen use practices of parents. According to Lescano et al., (1997) “. . . Perceived susceptibility to skin cancer, fewer perceived barriers to sun protection, and higher self-efficacy all appear to be essential elements in determining parental sun protection behaviors.” The research shows that the age of the child is a factor in how the parents' attitudes influence sunscreen use. With younger children, the parent has more control over protective behaviors and these children practiced sun protection as a result. With older children, ages 11-18, parental attitudes towards tanning and sunscreen were not associated with children's sunscreen use, but the parents' insistence on using sunscreen and their ability to protect the child from the sun were the most significant predictors (Cokkinides, 2004).

When looking at behaviors, parents of young children have been observed to only practice a small fraction of the sun protection behaviors recommended by the American Cancer Society to reduce skin cancer risk (Lescano, 1997). Other parents also reported using sunscreen, but only applying it to the face and upper body, missing important body parts. They also reported applying sunscreen to their children more often than applying sunscreen to themselves (Robinson, 2000). Parents who used sunscreen were predominantly of higher education level, higher socio-economic level, fair-skinned or White, and had a family history of skin cancer (Lescano, 1997; Robinson, 2000).

A concern with sunscreen use is the lack of parents using sunscreen correctly to protect their children while in the sun. Research also reports that people in lower socio-economic levels are less likely to use sunscreen (Lescano, 1997; Robinson, 2000). The samples in these past studies, however, had only a small representation of participants in lower socio-economic levels. And as past research demonstrates less sunscreen use in people of

lower socio-economic levels, it does not explain why this is so. Qualitative research needs to be continued in this area to explore the reasons for disparities in sunscreen use among socio-economic levels.

Significance

Past studies have looked at the relationships between sun protection knowledge and attitudes with sun protection behaviors of parents of young children and how those relate to children's sun protection behaviors. One similar study was done using interviews with parents; however, this study was conducted on a beach in Florida and resulted in homogeneous population. Most people were White and in higher socio-economic status (Lescano, 1997). Another similar study used phone interviews with parents using random digit dialing and had a large majority of people in higher socio-economic status (Robinson, 2000). This new study explored the same factors with parents, but it used a survey method and attempted to reach people of all socio-economic status. The use of sunscreen was divided into two categories, using sunscreen with children when they play outside and using sunscreen with children when they swim at the pool or beach, to see what characteristics of the participants correspond with sunscreen use and if there was a difference in sunscreen use among parents when their children play outside versus when their children are in water. This study also attempted to reach deeper into the issue of the less than satisfactory use of sunscreen across the U.S. by adding qualitative questions at the end of the quantitative survey.

This study described the relationship between parents' knowledge and attitudes about sunscreen use and their reported sunscreen use behaviors for their children. According to the Health Belief Model, it was hypothesized that the greater the parents' knowledge and positive attitudes towards sunscreen use, the more they would report healthy sunscreen use behaviors with their children. The Health Belief Model targets a person's motivation for taking actions towards a certain health behavior. The desire to undertake the action stems from the desire to avoid the negative health outcome, in the case of

this study, skin cancer. This model assumes that a person will undertake a health-related action if he/she feels that the negative consequence can be avoided, and can be avoided by taking the certain recommended action. The person also has the confidence that he/she can successfully complete the recommended action. The six concepts that are part of the Health Belief Model are perceived susceptibility of the problem (skin cancer), perceived severity (seriousness of skin cancer), perceived benefits (belief in efficacy of reducing the chance of skin cancer), perceived barriers (tangible and psychological costs of preventing skin cancer), cues to action (strategies to enact skin cancer prevention), and self-efficacy (confidence in one's ability to prevent skin cancer by using sunscreen) (NCI, 2003).

It was also hypothesized that there will be a disparity of sunscreen use among people in different educational levels (socio-economic levels) in this study. This has been found in past research, but again, this study attempted to gather a more representative sample of people in all socio-economic levels. The qualitative questions helped explore why disparities exist. It was hypothesized that along with the Health Belief Model holding true with lack of knowledge among people of lower educational levels, that sunscreen is perceived as too expensive.

This study examined sunscreen use in a rural population by looking at sunscreen use behaviors, sun protection and skin cancer attitudes and knowledge of parents of young children. For this study, young children were defined as ages twelve and younger, although to be eligible, children needed to be at least one year old. Neighborhoods in the rural area were randomly selected and the researchers walked door-to-door distributing surveys to parents of young children.

Methodology

Research Design

This study was a descriptive study that documented the sunscreen use behaviors, sun protection knowledge, and attitudes about sunscreen use of parents of young children. This

study was conducted in a rural community where there is a population of people in all socio-economic levels. The quantitative part of this study described what characteristics are found in parents of young children who use sunscreen. The qualitative part of this study explored how sunscreen use across parents of young children can be improved.

Methods of Data Collection

Data was collected by using surveys with quantitative and qualitative approaches. The rural population was clustered into neighborhoods by using a map of the community. This rural area consists of a town and a neighboring township. Surrounding the town and township is mostly farmland and houses are sparse; it would be difficult to create neighborhoods outside of these areas. The town has approximately 12,000 residents with blocks of houses and businesses and one university. Housing developments are found outside of the town. There are two school districts. Children residing in town attend one school district while children residing outside of the town attend the other school district. These two schools are approximately fifteen minutes apart (driving time). Individual housing developments outside of the town were each considered as a neighborhood. Sections of the town were divided into neighborhoods. The total number of neighborhoods created was twenty-seven. Neighborhoods were numbered and randomly selected by using a table of random numbers. The researchers walked door-to-door with the surveys to recruit participants for the study.

Instrument

The survey for this study was designed from an instrument that was used in a study by Lescano and Rodrigue (1997). The survey had socio-demographic items to assess parent and child age and gender, ethnicity, and educational levels of participant and spouse. Sun exposure attitudes and perceptions were assessed with items found in the Lescano and Rodrigue instrument. The coefficient alphas measuring reliability for these areas of the survey were as follows: perceived vulnerability/risk ($\alpha=0.74$); perceived illness severity, (no alpha derived due to having only one item); perceived barriers to change

($\alpha=0.04$); self-efficacy ($\alpha=0.64$); and response efficacy ($\alpha=0.61$) (Lescano, 1997).

Sun exposure knowledge and skin cancer knowledge were assessed with questions dealing with risk factors for skin cancer, sunscreen use, and other sun protective behaviors. The items for this study were utilized from the Lescano and Rodrigue study mentioned earlier. These researchers developed this component of the instrument from a measure developed by Katz and Jernigan (1991), materials published by the American Cancer Society (1988;1990), the American Academy of Dermatology (1988), the Council on Scientific Affairs (1989), and the Skin Cancer Foundation (1983: Hurwitz, 1988). The alpha coefficient for this area was 0.64.

Sun protection behaviors were assessed with questions pooled from the Lescano and Rodrigue study based on the ten reducing skin cancer risk behaviors recommended by the American Cancer Society. Questions addressed how often parents use sunscreen on their children when playing outside or at the pool, reapplication, and what SPF is used.

At the end of the survey, open-ended questions were asked of the participants to gather qualitative information. This information was used to explore why sunscreen use levels are lower than recommended in the U.S. and how we can work to change this. The survey was pilot tested with twelve parents in a convenience sample. These parents either lived outside of the town and neighboring township and/or were parents who had children above the age of twelve. Pilot test participants evaluated the survey for readability and comprehension. Corrections to the survey were made before the survey was given out for the study. Experts in the Public Health field were asked to review the survey for validity.

The types of data collected from this survey were ordinal for the behaviors and attitudes questions (questions were a Likert scale) and ratio for the knowledge questions. Frequency counts were done on gender, race, total number of children under eighteen years old in the household, and children in each age group.

Descriptive statistics were reported for age of participants, age of the children in the households, and the behavior and attitude questions. Percentages were reported for the age groups of participants, education level of participants, education level of spouses, and answers to the knowledge questions. The qualitative questions were used to further explain the relationships found in the SPSS analysis.

Analysis

The sample size was calculated using an *apriori* power analysis software program called GPOWER (Faul & Erdfelder, 1992). By convention, a power of 0.95 was chosen and a large effect size for each test. It was estimated that a two-tailed t-test would need approximately 84 participants ($\alpha = .05$, $d = .80$, power = .95). A sample for a t-test for correlations indicated that approximately 111 participants would need to be selected ($\alpha = .05$, $r = .30$, power = .95). A sample for a Chi-Square (χ^2) test was estimated to need 80 participants ($\alpha = .05$, $w = .50$, power = .95). The sample size chosen had to include the statistical test that required the largest sample size. These power analyses indicate that a sample size of 120 was a large enough sample for the statistical tests used in the study.

SPSS 11.0 was used to analyze the data. Determination of the relationships between parents always using sunscreen on children when they are outside and at the pool or beach and the participants' demographic information, knowledge, and attitudes about sunscreen was made. Cross tabulations and chi square tests were used to find relationships between whether the participants always use sunscreen on their children when playing outside or at the pool and gender, race, age, education level of the participant, education level of the spouse, and the knowledge questions. The Spearman rho (r_s) non-parametric correlation test was used to find if there was a relationship between the dependent variables of whether participants used sunscreen on their children when playing outside or at the beach pool and the independent variables. The independent variables were: 1) a child's chances of getting skin cancer, 2)

seriousness of skin cancer, 3) difficulty remembering sunscreen, 4) limited use due to cost, 5) confidence in increasing use, and 6) increased use leading to reduction of cancer risk.

Results

Characteristics of the sample are reported in Appendix A. Ninety-two surveys were completed in the nine week time period by females (N=69) and males (N=23). Participants from several races completed the survey: African American (N=3), Asian (N=2), Caucasian (N=85), Hispanic (N=1), and Pacific Islander (N=1). The mean age was 37.20 years (SD=7.30). The participants covered a wide age range: 21-30 years old (14.10%), 31-40 years old (55.50%), 41-50 years old (27.10%), and 51-60 years old (3.30%). The total number of children in the households under the age of eighteen was 208 (M=7.89, SD=4.45). Education level was recorded for each participant: less than high school diploma or equivalency (5.50%), high school diploma or equivalency (27.50%), some college or had an associate's degree (19.70%), four year college degree (17.60%), graduate school or professional school (17.60%), and post graduate school (12.10%). Education level of spouses were also recorded: less than high school diploma or equivalency (1.40%), high school diploma or equivalency (27.00%), some college or had an associate's degree (13.50%), four year college degree (27.00%), graduate school or professional school (20.30%), and post graduate school (10.80%).

Several of the demographic characteristics and the answers to the knowledge and attitudes questions were compared to the two behavior questions of how often sunscreen was used on participants' children when playing outside and when the children are at the pool or beach. Appendix A shows that the race of the participants was found to be significant with how often sunscreen was used with Asians and Caucasians reporting the highest sunscreen use both outside, $\chi^2(df)=33.60$, $p < .001$, and at the pool or beach $\chi^2(df)=66.6$, $p < .001$. Educational level of participants, $\chi^2(df)=34.90$, $p < .05$, was found to be a significant factor with how often sunscreen was used on children outside, post

graduate level showing the highest use (80.00%), but not significant with children being at the pool or beach.

Table 1 displays the results from knowledge section of the sunscreen survey. For the multiple choice questions dealing with the SPF most recommended by doctors, the hours that the sun is the strongest, consequences from a bad sunburn, and how often sunscreen should be reapplied, the correct answers were “SPF 15”

(85.90%), “10am-2pm” (56.50%), “all of the above” consequences (81.50%), and “every 2 hours” (57.60%), respectively. The following proportion of participants reported the correct responses for the following items: sunscreen is needed on cloudy/hazy days (94.60%), people with lighter skin color are more likely to develop skin cancer (48.90%), and the majority of skin damage is done before the age of eighteen (88.00%).

Table 1
Knowledge of Need for Sunscreen

	%	Always Use Outside		Always Use at Beach/Pool	
	N=92,%	N=92,%	χ^2	N=92,%	χ^2
SPF Recommendation					
SPF 3	1.10	100.00		100.00	
SPF 5	8.70	12.50		37.50	
SPF 10	3.20	33.30		33.30	
SPF 15	85.90	50.60	28.34***	96.20	36.51***
Sun's Strongest Hours					
8am-12pm	1.10	0.00		0.00	
10am-2pm	56.50	55.80		96.20	
12pm-4pm	34.80	34.40		81.30	
2pm-6pm	7.60	42.90	8.13	85.70	24.50***
Sunburn Consequences					
Dehydration	17.40	18.80		81.30	
Delirium	1.10	0.00		100.00	
Irregular Heart Beat	0.00	0.00		---	
Dangerously Low BP	0.00	0.00		---	
All of the Above	81.50	46.70	9.57*	90.70	1.45
Sunscreen Reapplication					
Every Hour	17.40	50.00		87.50	
Every 2 Hours	57.60	50.90		94.30	
Every 3 Hours	9.80	44.40		77.80	
Every 4 Hours	15.20	28.60	7.15	78.60	4.74
Application on Cloudy Days					
	94.60	47.10	0.63	90.80	4.96
Skin Color and Cancer Relationship					
	48.90	46.70	0.09	86.70	0.82
Skin Damage Prior to Age 18					
	88.00	48.10	4.34	93.80	15.43***

* p<.05, ** p<.01, *** p<.001

Table 1 shows the relationships between the responses to the knowledge questions and how often participants use sunscreen with their children outdoors and at the pool or beach. Knowledge of doctors' minimum SPF recommendation was found to be significant in how often sunscreen was used outside, $\chi^2(df)=28.34, p<.001$, and at the pool or beach, $\chi^2(df)=36.51, p<.001$. Knowledge of the sun's strongest hours was significantly related to how often sunscreen was used with children when at the pool or beach, ($\chi^2(df)=24.50, p<.001$). Knowledge of consequences from a bad sunburn was found to be a significant factor in how often sunscreen is used outside with children, $\chi^2(df)=9.57, p<.05$. Participants knowing that most of skin damage occurs prior to the age of eighteen was significantly related to how often participants use sunscreen with children at the pool or beach, $\chi^2(df)=15.43, p<.001$.

Table 2 displays the results from the sunscreen attitudes section of the sunscreen survey. Participant's perceptions of their children

developing skin cancer was measured on a scale of 1 = "almost certain he/she will not" to 5 = "almost certain he/she will" (M=2.05, SD=0.86). Participants' perception of seriousness of skin cancer was measure on a scale of 1 = "not at all serious" to 5 = "most serious health problem imaginable" (M= 3.87, SD=0.82). On a scale of 1 = "not at all" to 5 = "very difficult," participants recorded their difficulty in remembering to apply sunscreen to their children (M=2.13, SD=1.13). On a scale of 1 = "not at all" to 5 = "very often," participants recorded how often they limit sunscreen use due to its cost (M=1.22, SD=0.72). With 1 = "not at all" to 5 = "very confident," participants rated their confidence in increasing sunscreen use with their children (M=3.96, SD=1.09). With 1 = "strongly disagree," 2 = "disagree," 3 = "agree," and 4 = "strongly agree," participants rated how strongly they agreed or disagreed with a statement implying that using sunscreen reduces one's risk of developing skin cancer (M=3.57, SD=0.52).

Table 2
Sunscreen Attitudes

	Total	Outside Use		Beach/ Pool Use	
	N=92	N=92	r_s	N=92	r_s
		M, (SD)		M,(SD)	
Attitudes toward Sunscreen					
Child's chances of getting skin cancer ^a	2.05 (0.86)	3.42(1.17)	-.18	4.60(.95)	-.05
Seriousness of skin cancer ^b	3.87 (0.82)	3.42(1.17)	.22*	4.60(.95)	.04
Difficulty remembering sunscreen ^c	2.13 (1.13)	3.45(1.15)	-.41***	4.64(.88)	-.22*
Limit use due to cost ^d	1.22 (0.72)	3.48(1.12)	.13	4.68(.79)	-.24*
Confidence of increasing use ^e	3.96 (1.09)	3.48(1.12)	.06	4.66(.86)	.13
Increase use leads to reduced cancer risk ^f	3.57 (0.52)	3.40(1.18)	.08	4.59(.95)	.23*

^a Where 1 = almost certain he/she will not, 5 = almost certain he/she will; ^b Where 1 = not at all serious, 5 = most serious health problem imaginable; ^c Where 1 = not at all, 5 = very difficult; ^d Where 1 = not at all, 5 = very often; ^e Where 1 = not at all, 5 = very confident; ^f Where 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree ; *p<.05, **p<.01, ***p<.001

Sunscreen behaviors are displayed in Table 3. From a scale of 1 = "never", 2 = "sometimes," and 3 = "almost always," the frequency of sunscreen application on the participants'

children while playing outdoors (M=2.37, SD=0.66), and at the pool or beach (M= 2.85, SD=0.47) was recorded. On a scale of 1 = "never," 3 = "sometimes," and 5 = "almost

always,” reapplication of sunscreen on children at the pool or beach was recorded (M=3.61, SD=1.25). Table 3 also displays the percentages of participants that use various SPF’s of

sunscreen. The two most used SPF’s were SPF 30 (40.70% reported using) and SPF 45 (25.60% reported using).

Table 3
Sunscreen Behaviors

SPF used (%)	Total	Outside Use			χ^2	Pool/Beach Use			χ^2
		Never	Sometime	Always		Never	Sometime	Always	
	N=92, %	N=5, %	N=39, %	N=42, %		N=0, %	N=5, %	N=81, %	
SPF 5-15	14.00	0.00	17.90	11.90		0.00	20.00	13.60	
SPF 16-30	46.50	60.00	51.30	40.50		0.00	60.00	45.70	
SPF 31-50	39.50	40.00	30.80	47.60	3.40	0.00	20.00	40.70	.86

^a Where 1 = Never, 2 = Sometimes, 3 = Almost Always; ^b Where 1 = Never, 3 = Sometimes, 5 = Almost Always

*p< .05, **p< .01, ***p< .001

Sunscreen Behaviors and Attitudes

A Spearman rho (r_s) correlation was calculated for the relationship between the dependent variable of outside use of sunscreen and the independent variables of a child’s chances of getting skin cancer, seriousness of skin cancer, difficulty remembering sunscreen, limited use due to cost, confidence of increasing use, and increase use leading to reduced cancer risk (Table 2). A weak positive correlation was found for seriousness of skin cancer, ($r_s(90) = 0.22, p< .05$). A weak negative correlation was found for remembering to use sunscreen, ($r_s(90) = -0.41, p< .001$).

A Spearman rho (r_s) correlation was calculated for the relationship between the dependent variable of beach/pool use of sunscreen and the independent variables of a child’s chances of getting skin cancer, seriousness of skin cancer, difficulty remembering sunscreen, limited use due to cost, confidence of increasing use, and increase use leading to reduced cancer risk (Table 2). A weak negative correlation was found for difficulty remembering sunscreen, $r_s(90) = -0.22, p< .05$ and limited use due to cost,

$r_s(90) = -0.24, p< .05$. A weak positive correlation was found for increasing use leading to reduced cancer risk, $r_s(90) = 0.23, p< .05$.

Participants indicated that on average they almost always used sunscreen at the pool or beach (M=2.37, SD=0.66) and they sometimes used it when doing outdoor activity (M=2.85, SD=0.47) (Table 3). They sometimes reapplied it while at the pool or beach (M=3.61, SD=1.25). Over 80% of the participants who indicated that they sometimes or always used sunscreen outside or at the pool or beach used a SPF of 16 or higher. Of those who used outside or at the pool or beach sometimes or always, between 30-47.6% used a SPF of 31 or higher.

Qualitative Observations

The first of the two qualitative questions asked the participants what do they think are the reasons that Americans are not using sunscreen as often as they should be for it to be protective against the sun’s harmful rays. The most common answers include: people forget to apply and reapply due to losing track of time or becoming distracted; lack of knowledge about

sunscreen, such as, not knowing that they need to apply on cloudy days, they do not know the dangers of the sun, and they do not know how to apply it properly or do not think they need to reapply waterproof sunscreen; sunscreen is too expensive and people do not have it; people are too lazy to use sunscreen properly or are too busy to use it; and people desire a tan. Participants also reported that people might not perceive themselves or their children as being at risk for sun damage or skin cancer. Parents also pointed out that the sunscreen product itself might be the problem due to the oily, messy texture and smell; it is not easy to apply to children and reapply after children are swimming.

The second qualitative question asked participants how they thought sunscreen use could be increased among Americans. The most common idea dealt with raising the awareness of the dangers of the sun by using advertisements via the media. Participants said prevention measures should be explained and scare tactics used by showing pictures of what skin cancer does to a person's appearance. They also recommended using celebrity spokespersons. Advertisements should be geared toward both parents of young children, children, and teenagers. Participants also said that sun education could occur in schools and possibly schools could have samples or coupons for the children to use and take home. Other ideas that participants suggested were to use different approaches, such as wrinkle prevention. Participants also said that if sunscreen was made into more attractive or fun forms people might use it more. Examples include adding colors or sparkles, making more sunscreen sprays or wipes, and including it in more products like lotions and shower products.

Discussion

As annual skin cancer rates rise in the U.S., it is important that research continues to be done on products that are being used for sun protection and the knowledge, attitudes, and behaviors regarding use of those products. While past studies have been done, there populations have been limited (i.e., homogeneity and biased location). One of the goals of this study was to

reach a more diverse population, mainly, more people in lower socio-economic levels than has been done in the past. Since sunscreen is the most commonly used form of sun protection (Robinson, 2000), this study was designed to describe sun knowledge, attitudes, and behaviors of parents of young children. This research study was different from past research because it not only analyzed how factors such as knowledge attitudes affect sunscreen use, but this study separated sunscreen use into two categories: using sunscreen while playing outside and using sunscreen while at the pool or beach. Key characteristics were found between parents always using sunscreen with children playing outside and at the beach or pool and demographic, knowledge, and attitudinal information. Several differences were found from this research study than past studies.

A significant finding with the demographic information was that race is related to parents always using sunscreen with their children when playing outside and at the pool or beach, with Asians showing to use sunscreen the most with their children outside (100%) and at the pool or beach (100%), followed by Caucasians with their children outside (48.20%) and at the pool or beach (92.90%). Although this study attempted to gather a diverse population according to race, Caucasians comprised the majority (92.40%) while there were only two Asian participants (2.17%) and both reported always using sunscreen, showing 100% and possibly skewing the data and making it impossible to generalize the sunscreen use of Asians. It was expected, however, that a large proportion of Caucasians would show using sunscreen as this is the population at highest risk for developing skin cancer.

Past research has found that people of higher education levels and higher socio-economic status are more likely to use sunscreen (Robinson, 2000). This study did find a significant relationship with the participants' education level and always using sunscreen with their children when playing outside, but surprisingly, did not find a significant relationship with always using sunscreen with children at the pool or beach. Perhaps this is

because sunscreen is more commonly associated with sun protection during water related activities, but those with higher education levels also recognize the need for sunscreen when children are playing outside. Higher education levels can also imply higher socio-economic status. The issue may be that people with higher education levels, and higher socio-economic status, can afford to use sunscreen more often. More research needs to be done to explore this.

Past studies have not reported a significant relationship between knowledge of sun protection and sunscreen use (Lescano, 1997). This study, on the contrary, found that knowing what SPF is most often recommended by doctors as the minimum sun protection was found to be significantly related to parents always using sunscreen with children while playing outside and at the pool or beach. This may show that doctors have an impact on how often parents use sunscreen with their children; however, the correct answer was the highest value choice for that question. Participants might have wanted to pick the highest value on the side of caution, thus giving misleading results. Knowledge of the sun's strongest hours was significantly related to participants always applying sunscreen on children at the pool or beach. On average, the overall group of participants reported almost always using sunscreen with their children at the pool or beach and only sometimes when their children are outside. Since the importance of sunscreen seems higher with water related activities, and these activities typically expose more skin (swimsuits), parents might be more aware of when their children are exposed to harmful sunrays. Knowing the consequences of a bad sunburn was significantly related to parents always using sunscreen when their children are outside, and knowing that the majority of skin damage occurs prior to age eighteen was significantly related to parents always using sunscreen when children are at the pool or beach. On surprising finding was the number of participants who correctly answered that sunscreen is needed on cloudy days (94.60%). This contradicts past research that sunscreen is perceived as less important on cloudy days (Robinson, 2000). It is highly doubtful that the

same percentage of people actually regularly uses sunscreen on cloudy days; this piece of knowledge was not found to be significant with sunscreen use. The form of the knowledge questions on the survey made parents select a choice; there was not an option of "I do not know." Further research with these knowledge questions should be done to clarify if they are truly significant. If these pieces of sun protection knowledge are truly significant in leading people to use sunscreen, they should be integrated into future sun protection awareness programs.

It was hypothesized that attitudes about sunscreen protection and skin cancer would be significantly related to parents always using sunscreen with their children. The questions on the survey were based on the Health Belief Model. Of the six questions in the attitude section, four were found to be correlated with parental sunscreen use. It was found that sunscreen use of parents with their children when outside increased as the perceived seriousness of skin cancer increased. There was probably no correlation with using sunscreen at the pool or beach because parents already reported on average "almost always" using sunscreen in those locations. As to be expected, the more difficult it was for parents to remember to apply sunscreen to their children when outside and at the pool or beach, the less sunscreen they used with their children when in these locations. The cost of sunscreen had an effect on parental sunscreen use with their children at the pool. The more parents had to limit sunscreen use due to cost, the less they used sunscreen on their children. This may be why sunscreen was reported as too expensive when participants were asked why people do not use sunscreen as much as they should. Those parents who more strongly agreed that sunscreen use will reduce the risk of skin cancer also were more likely to use it with their children at the pool or beach, confirming the perceived benefits concept of the Health Belief Model. One of the questions explored self-efficacy by asking the parent how confident they were that they could increase their child's use of sunscreen. Some parents answered "not at all" because they felt that they were already doing all of the recommended safety measures, thus this question did not truly

show how well parents were currently protecting their children. Future clarification with careful wording of this question should be done to re-explore the role of self-efficacy with sunscreen compliance.

The qualitative information brought to light that the most common hindrances to sunscreen use are lack of responsibility (forgetfulness), the lack of knowledge of how it should be used and how serious the dangers of the sun are, the price of sunscreen, and the desire to look tan. Appropriately, when asked how to improve sunscreen use in the U.S., the most common answers related to increasing awareness through social marketing campaigns. Participants want to see more information about why sunscreen is so important and how they should use it. This campaign, they said, should involve doctors, schools, boy and girl scouts, and the media. They also want to see messages that deter people from tanning and use scare tactics (visual aids) to show the consequences of skin damage. If knowledge about sun protection is truly related to how often sunscreen is used by parents, as this study shows, this campaign would be justified. These ideas should be a guide in designing messages for health education programs and social marketing campaigns. The social marketing could also change and improve attitudes related to sun protection, as has been shown to be important in research.

One limitation to this study was the access to the subjects eligible for this study. After neighborhoods were randomly selected, two researchers walked door-to-door to gather participants to complete the survey. It was not known how many families in each neighborhood have young children. Therefore, it was unknown if families were missed due to work schedules. To accommodate this situation, various hours of the day were chosen for collection of data.

In addition, neighborhoods or parts of neighborhoods within this rural area may have been eliminated to ensure personal safety of the researchers. Only parents who have children between ages one and twelve years old participated. These children are most likely to

depend on their parents for sun protection resources, like sunscreen, and may even rely on a parent to apply sunscreen. Children under the age of one were left out due to the recommendation that sunscreen should only be used on children that are at least six months old.

The area was limited to the town and one neighboring township because this is where most of the houses were located. Outside of these were farmlands. Houses were more disperse and harder to quantify into neighborhoods. Some racial and ethnic groups were underrepresented and so generalizations to the larger population are limited.

In conducting this study, the researchers assumed that parents who agreed to participate in this study would be honest in their reporting of sunscreen use with their children on the surveys. They also assumed that parents of all socio-economic levels would be willing to participate so that they achieved an even representation of all socio-economic classes in this study. To determine participants' socio-economic status, it is assumed that a higher education level corresponds with a higher household income.

This study attempted to explore what factors are important in the likelihood that parents will use sunscreen with their children while they play outside or are at the pool or beach. Certain knowledge and attitudes about sun protection were found to be important for parents to use sunscreen. By exploring what could be done to improve sunscreen use in the U.S., the common answer was to improve awareness and education about sun protection through social marketing campaigns. Messages need to be directed at all age levels and the messages need to be heard from a variety of sources.

It is also vital that research in this area continues as sunscreen products are constantly changing and being updated. Further research should also be continued to more clearly define what factors lead parents to use or not use sunscreen with their children, as they are the most vulnerable population.

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Appendix A Sample Demographics

	Total	Always Use Outside		Always Use at Pool/Beach	
Demographics	N=92, %	N=92, %	χ^2	N=92, %	χ^2
Sex					
Female	69	49.30		91.30	
Male	23	39.10	0.95	82.60	2.15
Race					
African American	3.0	0		33.30	
Asian	2.0	100		100.00	
Caucasian	85.0	48.20		92.90	
Hispanic	1.0	0		0	
Pacific Islander	1.0	0	33.60***	0	66.78***
Age (Mean, SD)	37.15 (7.34)	38.74 (7.09)		37.6(7.46)	
21-30	14.10	46.20		76.90	
31-40	55.40	52.90		92.20	
41-50	27.20	32.00		88.00	
51-60	3.30	66.70	8.76	100.00	3.18
Education Level of Participant					
<High School	5.50	40.00		60.00	
H.S or Equivalent	27.50	40.00		84.00	
Some College, Associate's Degree	19.70	55.56		88.89	
College Grad	17.60	37.50		93.75	
Grad or Professional School	17.60	16.67		91.67	
Post Grad School	12.10	80.00	34.92*	100.00	21.10
Education Level of Spouse					
<High School	1.40	0		100.00	
H.S or Equivalent	27.00	40.00		75.00	
Some College, Associate's Degree	13.50	60.00		100.00	
College Grad	27.00	35.00		100.00	
Grad or Professional School	20.30	90.90		100.00	
Post Grad School	10.80	41.67	28.33	91.67	14.10
Total Children <18 in household					
1-2	61.0	---	---	---	---
3-4	28.0	---	---	---	---
5-6	3.0	---	---	---	---
Children's <18 Ages (Mean, SD)	7.89 (4.45)				
<1	6.0	---	---	---	---
1-5	67.0	---	---	---	---

	Total	Always Use Outside		Always Use at Pool/Beach	
Demographics	N=92, %	N=92, %	χ^2	N=92, %	χ^2
6-10	76.0	---	---	---	---
11-15	49.0	---	---	---	---
16-17	10.0	---	---	---	---

*p< .05, **p< .01, ***p< .001