

Florida Institute of Technology

Scholarship Repository @ Florida Tech

Theses and Dissertations

11-2023

Sun Protection Behaviors and Skin Cancer Risk among Children of Color

Williana Magloire

Florida Institute of Technology, wmagloire2019@my.fit.edu

Follow this and additional works at: <https://repository.fit.edu/etd>



Part of the [Medicine and Health Sciences Commons](#), and the [Psychology Commons](#)

Recommended Citation

Magloire, Williana, "Sun Protection Behaviors and Skin Cancer Risk among Children of Color" (2023).
Theses and Dissertations. 1368.

<https://repository.fit.edu/etd/1368>

This Doctoral Research Project is brought to you for free and open access by Scholarship Repository @ Florida Tech. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholarship Repository @ Florida Tech. For more information, please contact kheifner@fit.edu.

Sun Protection Behaviors and Skin Cancer Risk among Children of Color

by

Williana Magloire, M.S.

Master of Science
Clinical Psychology
Florida Institute of Technology
2022

Master of Science
Psychology
Florida International University
2019

Bachelor of Science
Psychology
Florida A&M University
2017

A doctoral research project
Submitted to the School of Psychology at
Florida Institute of Technology
In partial fulfillment of the requirements for the degree of

Doctor of Psychology
In
Clinical Psychology

Melbourne, Florida
November 2023

We the undersigned committee hereby approve the attached Doctoral Research
Project, “Sun Protection Behaviors and Skin Cancer Risk among Children of
Color”

by
Williana Magloire, M.S, M.S.

Vida L. Tyc, Ph.D.
Professor
School of Psychology
Major Advisor

Patrick J. Aragon, Psy.D.
Assistant Professor
School of Psychology

Kimberly Sloman, Ph.D., BCBA-D
Associate Professor
School of Behavior Analysis

Robert A. Taylor, Ph.D.
Professor and Dean
College of Psychology and Liberal Arts

Abstract

Title: Sun Protection Behaviors and Skin Cancer Risk among Children of Color

Author: Williana Magloire, M.S., M.S.

Adviser: Vida L. Tyc, Ph.D.

Sun protection is beneficial for children of color as it decreases the risk for sunburns, hyperpigmentation, and most importantly, skin cancer. Invasive melanoma is commonly seen in children of color due to inadequate sun protection. Parental and caregiver modeling of sun protection behaviors may decrease the likelihood of skin cancer among children of color. The American Academy of Pediatrics (AAP, 2011) has suggested that pediatricians adopt the role of informing parents about the benefits of using sun protection products for their young children. They recommended that providers discuss sun protection behaviors with both the parent/child beginning at the age of 9 or 10 years. Similarly, the United States Preventative Services Task Force (USPSTF) has recommended that medical providers (i.e., dermatologists and pediatricians) counsel parents about use of sunscreen for their children. This cross-sectional study utilized an online survey targeting parents of color who have children of color ≤ 12 years of age. The objectives of this study were aimed to determine the proportion of parents of color who received pediatric sun exposure education/counseling from pediatric providers and rated themselves satisfied with the information. Additionally, this study

examined factors associated with perceptions of skin cancer risk among parents of color and how these influenced their compliance with pediatric sun protection guidelines. Results of this study found that 32.6% of parents of color reported that they received sun protection education/skin cancer risk prevention counseling from their child's medical provider within the past year. Of the parents who reported receiving information from their provider, the majority rated themselves as satisfied with the information their pediatric provider provided them. Perceptions of the child's cancer risk and compliance with pediatric sun protection guidelines were not significantly different between parents who received counseling from their child's provider and those who did not. However, parents' perceptions of their child's skin cancer risks were positively related to perceptions of their own risk. Overall, the majority of parents were only partially compliant with sun protection guidelines for their child. The findings from this study will be utilized as a resource for parents and providers. These study results should encourage pediatric providers to provide appropriate interventions and resources to families of color regarding sun protection for themselves and their child.

Table of Contents

Abstract.....	iii
List of Tables.....	vi
Acknowledgments.....	vii
Chapter 1: Review of Literature	1
Prevalence for Non-minority Population.....	1
Prevalence for People of Color.....	3
Sun Protection Behaviors among Children.....	5
Sun Protection Behaviors among Children of color.....	9
Sun Protection Guidelines and Treatment Practices of Providers.....	12
Health-Related Factors Influence and Compliance.....	17
Perceptions & Attitudes, Perceived Risk, Behaviors.....	17
Chapter 2: Rationale.....	25
Chapter 3: Objectives and Hypothesis.....	28
Participants and Setting.....	29
Chapter 4: Methods and Procedures.....	31
Outcome Measures.....	31
Chapter 5: Research Design and Analysis Plan.....	35
Chapter 6: Results.....	37
Chapter 7: Discussion.....	47
Chapter 8: Limitations and Areas of Future Research.....	52
References.....	57
Appendix A: Letter of Informed Consent.....	67
Appendix B: Survey.....	70

List of Tables

Tables	54
Table 1: Descriptive Statistics for Parental Demographic Variables.....	54
Table 2: Descriptive Statistics of Child Demographic and Medical Variables.....	55
Table 3: Frequency of Child’s Compliance with AAP Guidelines for Sun Protection (Endorsed ‘Always’).....	56
Table 4: Reported Skin Tone for Parent and Child Based on Fitzpatrick Photo- Typing Scale.....	56

Acknowledgments

Dr. Tyc: I cannot thank you enough for your patience and help during this experience. You have been very supportive throughout my challenges and victories. When I didn't believe I could get through another hurdle, you were right there with an encouraging word to help me through it. I would not have been able to submit a strong project without your help, patience, dedication, and passion. Again, I thank you for staying true to who you are.

Committee Members: Thank you all for your help and feedback. You all have been very patient with me since the onset of this project. It is with your help and feedback that I can submit a strong project.

Family and Friends: I thank you all for your love and support. Thank you for your help in sharing my research survey. I would be not able to share my final project without your help in collecting participants. I appreciate every single prayer, encouraging word, positive text that you all have sent me. I love you all

Chapter 1: Review of the Literature

Prevalence of Skin Cancer for Non-Minority Population

Skin cancer is the most widely diagnosed cancer in the United States and consists of various types, typically categorized as non-melanoma types and melanoma skin cancers. More specifically, non-Melanoma includes basal and squamous cell, merkel cell, lymphoma, and kaposi sarcomas (American Cancer Society, 2021). One in five Americans are likely to develop skin cancer in their lifetime with approximately 9,500 people in the U.S. are diagnosed with skin cancer every day (American Academy of Dermatology, 2022). Caucasian Americans have a greater risk of developing melanoma and non-melanoma skin cancer compared to people of color (Sangha, 2022). Basal cell carcinoma is typically found in the lower part of the epidermis which is the top layer of skin; it is the most leading skin cancer seen in Caucasian Americans, accounting for 65 to 75% of skin cancer in Caucasian Americans (American Cancer Society, 2022 & Sangha, 2022). Squamous cell carcinoma starts in the flat cells in the upper (outer) part of the epidermis and is seen in 15 to 25% of the Caucasian American with skin cancer (American Cancer Society, 2022; Sangha, 2022).

Merkel cell is less common than other skin cancers, however, it is one of the most threatening. This type of skin cancer develops when the merkel cell in the body starts to spread very rapidly in the head, neck, and extremities (American Cancer Society, 2022; Deneve, 2012). As such, merkel cell carcinoma is more

mainstream in elderly Caucasian Americans and more than 9 out of 10 skin cancer cases are diagnosed within Caucasian Americans (American Cancer Society, 2022; Deneve, 2012). Similarly, lymphoma is a rare skin cancer whose onset occurs in the white blood cells, however, it can start in any part of the body that contains lymph tissues (American Cancer Society, 2022). Lastly, kaposi sarcoma advances from the cells that line lymph and blood vessels. Although it is rare in the United States, it is still seen 1 in 200 transplant patients (American Cancer Society, 2022). While basal and squamous cell cancers are nonmalignant, melanoma is malignant and begins in the pigment-producing cells in the top layer of the skin; it is more dangerous as it can spread to various parts of the body (i.e., eyes, mouth, and genitals) if left undetected (American Cancer Society, 2021).

In 2020, it was estimated that 101,000 cases of melanoma affected the U.S. population (Rahib et al., 2021). Rahib et al. (2021) proposed that by year 2030, melanoma would reach 155,000 incidences and by 2040, melanoma would be the second most common cancer with 219,000 estimated instances (Rahib et al., 2021). As rates of melanoma continue to increase, there is a rise in incidence rates among non-minority groups, as much as 22.1% among Caucasian adults and a 2% incidence rate among children and adolescents 15-years-old and younger (Guy et al., 2015). Danysh et al. (2019) reported an increase in melanoma incidence rates among non-Hispanic Caucasians and adolescents. Notably, children and adolescents typically have only a 5-year survival rate after receiving a melanoma

diagnosis (Danysh et al., 2019). Researchers have predicted the costs of treating recently diagnosed melanoma to triple by the year 2030 (Guy et al., 2015).

Risk factors related to the increased incidence rates of melanoma include intense sun exposure during leisure-time activities, wearing less covered clothing, and increase experiences with tanning beds. Excessive exposure to solar ultraviolet radiation is a critical risk factor for skin cancer (Littlewood & Greenfield, 2018; Thoonen et al., 2019). Pediatric non-melanoma cancer is rare. Unlike adults, where chronic sun exposure is a primary risk factor for nonmelanoma skin cancers, nonmelanoma skin cancers have generally been reported in children with heritable and congenital conditions. Approximately 44% of nonmelanoma skin cancer cases in children has been associated with a predisposing skin lesion or a genetic condition, most commonly basal cell nevus syndrome and xeroderma pigmentosum (Huang et al., 2019). Pediatric nonmelanoma cancer is also associated with several exposures related to prior medical treatments known to increase risk for skin cancer including prolonged immunosuppression (weak immune system), voriconazole use (antifungal medication), radiation therapy, chemotherapy, a prior oncologic diagnosis, hematopoietic stem cell transplantation, and having an organ transplant (Huang et al., 2019).

Prevalence of Skin Cancer for People of Color

Compared to Caucasian Americans, 1 to 2 percent of people of color are diagnosed with skin cancer, while 2 to 4 percent in people of Asian descent and 4 to 5 percent in people of Hispanic descent are diagnosed with skin cancer in their

lifetime (Sangha, 2022). Squamous cell is the most prevalent skin cancer seen in African Americans and Asian-Indian populations with incidence rates of 30-65% reported in their lifetime (American Cancer Society; Sangha, 2022). Squamous cells are mostly seen on the buttocks, hips, legs, knees and feet of African Americans (American Cancer Society; Sangha, 2022). Basal cells are commonly seen in dark brown to black pigment skin variants. As such, people of color have a 50% higher incidence of basal cell carcinoma than their Caucasian counterparts (American Cancer Society; Sangha, 2022). Melanocytes are the cells that make up the brown pigment in the skin of people of color. Melanoma is more prevalent in non sun-exposed areas in people of color such as the palms, soles and underneath the nails (American Cancer Society ; Sangha, 2022). However, the plantar foot is frequently the location where melanoma is discovered (Sangha, 2022). Rates of melanoma among people of color have a 20- to 30- year lower incidence rate than Caucasians. The lifetime prevalence rate of melanoma is estimated to be 1 in 1,000 (Sangha, 2022) among people of color.

High rates of skin cancer are linked to increased morbidity and mortality (Bradford, 2009). As such, the survival rate is the lowest among people of color who develop melanoma (Guy et al., 2015). The variation in survival rates depends on the disease being detected and diagnosed at a less advanced stage (Bradford, 2009). The low survival rate of melanoma among people of color is likely due to its typical development in shielded places on the skin, thereby leading to later detection and diagnosis, and more advanced disease. This combined with

perceptions of the provider and the patient that people of color are at low risk for melanoma contributes to the low survival rates reported (Guy et al., 2015).

Sun Protection Behaviors among Children

Excess sun exposure and limited engagement in sun-protective behaviors like sunscreen use during childhood continue to contribute to the development of high skin cancer rates later in life (Correnti et al., 2018). As such, Hunter et al. (2010) conducted a study that examined 4th grade student assessment of sun protection behaviors outside at school and outside the school setting. This study utilized baseline data collected from all 4th grade students in Hillsborough County Schools, FL in 2006 for the Sun Protection for Florida's Children (SPF). The study included direct observation of students (in physical education courses) and survey data collected from 2,086 4th grade students who self-reported their sun protection behaviors. Hunter et. al. (2010) concluded one third of students reported that they wore sunscreen (32.8%) or sunglasses (32.3%) before leaving home for school. Only a small percentage of students wore long sleeves (15.0%) or a hat with a brim (16.4%) before leaving for school. In addition, few students wore a hat with a wide brim when outside but not at school (16.4%). In general, white, or male students were less likely to practice sun protection behaviors at school. Also, students who attended schools with a required uniform policy were less likely to wear hats with brims (Hunter et al., 2010). The results from this study suggested that sun protection methods are infrequently utilized among children and when used, it most

often consisted of using sunscreen and wearing sunglasses rather than protective clothing such as a wide-brimmed hat (Hunter et al., 2010).

Similarly, Miller et al. (2021) assessed sun protection patterns over time in 3,710 school children. A three-armed randomized controlled trial was conducted between 2012 and 2016 with two sun safety intervention groups (N = 3368) and an observation-only control group (N = 342) among 4th and 5th graders from 24 public schools in Los Angeles County (Miller et. al., 2021). The two intervention conditions included a curriculum-only group and a curriculum-only plus science lab. The didactic and interactive curriculum covered the dangers of excessive UV exposure and addressed the barrier methods of UV protection such as protective clothing and sunscreen use and was designed for children from ethnically and racially diverse backgrounds and with diverse skin types. Students received three one-hour lessons during regular class time taught by trained health educators; students in the curriculum plus lab condition received an additional one-hour lesson in which children measured UV in teams on the playground.

Using a latent transition analysis, both sun safety interventions conditions were compared to controls. Five self-reported sun protective behaviors were measured at baseline and three-month follow-up: use of sunscreen, long sleeves, long pants, hats, and shade seeking. At baseline, four patterns of sun protection behaviors were found: children who engaged in 1) all sun protective behaviors; 2) few protective behaviors; 3) protective clothing and shade only; and 4) hats only. Children in the control group were likely to maintain their baseline position or

transition to a less protective status at three-month follow-up. By contrast, 30% of children in the intervention group transitioned to a more protective status at follow-up (Miller et al., 2021). In this RCT of a sun safety intervention, children in the intervention group adopted more protective behaviors, such as use of protective clothing and seeking shade, compared to controls. (Miller et al., 2021).

In an older study, Dixon et al., (1999) measured children's knowledge and attitudes related to sun exposure, and reported usual behaviors relevant to sun protection, as well as parents' encouragement of their children's sun protection among a sample of 735 primary school students and their parents, in Victoria, Australia. The parent questionnaires assessed parental encouragement of children's sun protection behavior and their reports of children's usual sun protection behavior with the following items : "On sunny days when s/he goes outside, how often do you *encourage* each child to. . .," and "On sunny days when outside how often do each of you. . ." Parents were asked about five sun protection behaviors: "Wear sunscreen on exposed areas"; "Wear a hat"; "Cover up with clothes"; "Stay in the shade"; "Choose activities that will minimize his/her sun exposure (e.g., stay inside or in shade)" (encouragement only) and "spend most of the time between 11 AM and 3 PM inside" (behavior only). Parents also recorded separately the frequency with which *each* sun protection behavior was encouraged by the parent and carried out by the child, on a five-point scale ranging from never (1) to always (5). The child interview focused on questions assessing children's knowledge of sun protection, the child's reports of the explanations their parents

had given them as to why they should not get a sunburn, and several other related items. The incidence of sunburn among the children was monitored weekly over an 8-week period. Results indicated that children's knowledge of sun protection and engagement in sun protective behaviors was generally high. Interestingly, although knowledge increased with age, sun protection behaviors decreased. Sunburn rates also increased with age. Of note was that children's knowledge of sun protection continued to increase as they received greater encouragement about sun protection from their parents. Further, the findings from this study suggested the mid-primary school years may be a critical time for interventions focused on sun protection.

Using a large cross-sectional study, Geller et al. (2002) collected self-reported questionnaire data from over 10,000 boys and girls, 12 to 18 years of age, from all 50 states, who were children of the participants from the Nurses' Health Study (Growing Up Today Study). As non-white and other races/ethnicities have a lower risk of sunburn compared to their white counterparts, researchers decided to focus their attention on White children. Outcomes assessed in this study included: (1) routine use of sunscreen, (2) the presence of at least 3 sunburns during the past summer, and (3) use of a tanning booth or salon during the past year. The reported prevalence of sunscreen use was 34.4% with girls more likely to use sunscreen than boys (OR 40.0 vs 26.4). Almost 83% of respondents had at least 1 sunburn during the previous summer, and 36% had 3 or more sunburns. Nearly 10% of respondents used a tanning bed during the previous year, with girls reporting more tanning bed

usage (14.4 vs 2.4). Interestingly, various attitudes were connected to more use of tanning beds and frequent sun burns: preference for tanned skin, having many friends who were tanned, and belief in the worth of burning to get a tan. Overall, Geller et al. (2002) suggested that children were at increased risk for skin cancer in the future due to their limited sunscreen use, high rates of sunburning, and tanning bed use.

Sun Protection Behaviors among Children of Color

Related to children and adolescents, cancer continues to be a leading cause of death in those who are 1-14-years of age (American Cancer Society, 2022). Even with increased rates of skin cancer observed among pediatric populations, little is known about the sun protection behaviors among children of color (Miller et al., 2015). Few studies addressing sun protection and skin cancer reduction interventions have been conducted with pediatric samples of children of color and the reasons for the scarcity of research in this area may be reflective of the many cultural and linguistic barriers children of color face, making it difficult for them to participate in research studies. This can also include a lack of access to healthcare and mistrust of the medical system and low willingness to participate in research studies. As such, this section allows for a limited review of the sun protection behaviors among children of color.

Miller et al. (2015) studied sun-protective behaviors among Hispanic elementary students in Los Angeles, as the prevalence of skin cancer and invasive melanoma is notable within this population. With the sample consisting of 972

elementary students, a cross-sectional survey was conducted to evaluate the pattern of behaviors for sun protection. Baseline data were used from the SunSmart study, a school-based sun safety intervention conducted in Los Angeles in 2013–2014. The analytic sample was restricted to students who self-reported as Hispanic/Latino. Paper-and-pencil questionnaires were administered in English before implementation of intervention activities. Results showed only 75% of Hispanic children participated in consistent sun protective behaviors, such as use of protective clothing and seeking shade (Miller et al., 2015). Additionally, boys reportedly engaged in less protective behaviors than females. Most notably, children who presented with strong sun protection behaviors had parents who were more involved in the oversight of their child’s sun protection practices.

Similarly, Altieri et al. (2018) examined the rate of occurrence for sunburns and the use of sun-protective behaviors among 2,003 Hispanic-Light brown skin elementary school children in Los Angeles using a cross-sectional survey. Survey items were self-reported by students without help from parents or teachers. This study examined baseline sun protection practices of fourth and fifth grade children participating in SunSmart, a school-based intervention in Los Angeles, California during 2013–2015. Study findings aligned with the results reported by Miller et al., 2015. This study found that the participant's methods of sun protection were not effective in preventing sunburns and not sufficient to decrease the likelihood for risk of skin cancer. The most common methods of sun protection used by children included wearing long sleeves, long pants, and shade seeking. Although more than

half of Hispanic children reported wearing protective clothing and sunscreen “often” or “sometimes”, most (62%) had ‘ever’ sunburned, and more than half (59%) reported a sunburn since the last summer. The researchers concluded that practical sun protection methods should be shared with children to make them better aware of the threat of skin cancer and ways to prevent skin cancer risk.

Patel et al. (2019) focused their study on sun exposure and protective behaviors among children and adolescents living in the United States. A cross-sectional survey on perceived sun exposure and protective behaviors was administered at three sports medicine clinics in California, Colorado, and Hawaii. Researchers assessed sun protective behaviors by geographic location and gender with the following survey items: “Do you sunburn easily without sunblock?” “How often do you wear sunscreen?”, “How often do you wear a shirt with sleeves that cover your shoulders?” , “How often do you wear a hat?” , “How often do you stay in the shade or use an umbrella?” , “How often do you wear sunglasses?”, “How often do you wear clothing made with specific sun protective material (fabric with SPF capabilities)?” ; and lastly, “How often do you spend time in the sun in order to get tan?” Responses were measured with a 5-item frequency scale: Never, rarely (25% of the time or less), Sometimes (50% of the time), Often (75% of the time or more), and Always. In total, 860 surveys were collected (52% female, 48% male; mean age 12.7 years); and (n=442) reported having dark white skin to dark brown/black skin tone (Patel et. al., 2019).

In this study, females reported significantly greater frequency of sunscreen use ($p = 0.001$), staying in the shade, or using an umbrella while in the sun ($p = 0.004$), and tanning ($p < 0.001$). Participants in Hawaii reported using sunscreen less frequently than those in California and Colorado ($p < 0.001$). These results identified high-risk populations such as males, older adolescents, and Hawaii's youth who may not be practicing frequent sun protective behaviors. Participants with darker skin and hair were less likely to engage in sun protective behaviors than those with lighter skin and hair due to their low perceived risk of skin cancer, potentially accounted for by perceived differences in tendency to sunburn, societal messaging, misinformation, or the influence of other social cultural norms. (Patel et al., 2019).

Sun Protection Guidelines and Treatment Practices of Providers

The care and guidance of providers is critical to mitigating the risk of skin cancer in children and adolescents (Gupta et al., 2016). Providers are strongly encouraged to provide parents with advice about preventative behaviors and measures to decrease the risk of skin cancer for their children. The U.S. Preventative Services Task Force (USPSTF, 2018) has provided recommendations about the advantages for specific clinical preventative services based on an evidence-based review of literature. The USPSTF (2018) concluded that there is a moderate benefit from providers delivering behavioral counseling interventions to parents for pediatric sun protection. There is a significant advantage to counseling parents to decrease the likelihood of UV radiation for their children starting at the

young age of 6 (USPSTF, 2018). Ultimately, providers hope to encourage parents to engage in frequent sun protection behaviors for their child such as broad-spectrum sunscreen use, dress modifications (i.e., hats, sunglasses, protective clothing), avoidance of excess sun exposure, seeking shaded areas during midday hours, and avoiding indoor tanning beds (USPSTF, 2018).

Like the USPSTF guidelines, the American Academy of Pediatrics guidelines (AAP, 2011) also advised healthcare providers to provide parents/caregivers with information about UVR exposure and sunscreen use (AAP, 2011). Additionally, providers should offer advice about having at least one health-maintenance visit per year beginning in infancy and engaging in sun-safe outdoor physical activity (AAP, 2011). The AAP (2011) has recommended that providers discuss sun protection behaviors with both the parent/child beginning at the age of 9 or 10 years old. Similarly, AAP (2011) suggested that providers should recommend that infants younger than 6-months-old to be kept out of direct sunlight. Lastly, it was recommended that providers should advocate for sun protection policies (i.e., shaded playgrounds, allowing hats at school and childcare facilities) and support legislation to prohibit accessibility to tanning salons for individuals younger than 18-years old (AAP, 2011).

Fuzzell et al. (2018) questioned 256 parents of children 6-years of age and younger with an online survey about sunscreen use and found increased compliance with this behavior among parents who reported better communication with their providers. Many of the respondents were White American (80.6%) and female

parents (60.1%). Researchers found that better communication between the provider and parents positively affected parents' adherence to providers' guidelines secondary to the trust and comfort they developed in speaking with their providers.

Similarly, Balk et al. (2017) employed a random sample of members of the American Academy of Pediatrics in primary care from 2002 and then later in 2015 to assess changes in sun protection counseling practices by providers across the years. Researchers distributed surveys to providers about attitudes and experience with sun protection counseling and reported a 55% response rate in 2002 and a 43% response rate in 2015. Overall, there were more female providers (62%) who participated in the study than males (38%). Participants from both years were asked, “During the most recent summer months (i.e., June, July and August), with what proportion of patients/parents with children in the following age groups have you discussed sun protection at least once?” Response choices were dichotomized to identify pediatricians who counseled most patients (defined as 75%–100% of patients [vs <75%]) for each of 5 age groups (birth–6 months, 7 months–2 years, 3–9 years, 10–13 years, and ≥ 14 years). A summary measure to indicate participants discussing sun protection with $\geq 75\%$ of patients in all 5 age groups was evident by (“no” or “yes”) response. In 2002, 23% of providers reportedly delivered sun protection counseling while 34% of providers counseled patients about sun protection in 2015. In 2015, more pediatricians reported recommending protective clothing and fewer recommended sunscreen use compared to those in 2002 for unspecified reasons. In 2015, 1 in 4 pediatricians (28%) provided indoor tanning

counseling to $\geq 1\%$ of their patients in all 3 age groups. One in 3 (34%) pediatricians reported discussing the need to avoid indoor tanning, at least once with patients ages 10 to 13 years, and approximately half discussed indoor tanning with older adolescents (50% for patients 14–17 years and 47% for 18–24 years). Although results suggest that more pediatricians are talking with their young patients about sun protection, time is identified as the key barrier in providing more frequent sun protection counseling (Balk et al., 2017).

Holman, et al. (2019) utilized a web-based survey of U.S. primary care providers to assess the counseling practices of 1,506 providers. The final sample consisted of 48.7% white medical providers; included were 480 nurse practitioners, 523 internists, 250 pediatricians, and 253 nurse practitioners. Providers were questioned about their skin cancer prevention counseling practices with typical patients. Survey items included beliefs about prevention and counseling, frequency of counseling (regularly, occasionally, only when the patient or guardian inquires, or rarely/never), who within the practice provides the counseling, respondent's confidence in his or her own ability to counsel, characteristics of patients who are typically counseled, recommendations provided when counseling, and barriers to counseling. This study identified almost half of the participants (48.5%) engaged in consistent counseling sun protection behaviors with "most" or "all" of their patients having fair skin tone. Providers recognized several obstacles with nonadherence to providing counsel to patients in general (i.e., lack of time, other pressing concerns, and patient disinterest; Holman et al., 2019).

Attending to people of color, Song et al. (2020) examined sources of sunscreen recommendations or counsel for patients of color on social websites and from dermatology clinics. Anonymous surveys were completed regarding sunscreen protection recommendations provided by dermatologist trainees and board-certified dermatologists. Survey participants were mostly women (n=55) who had skin type II to III (fair skin to dark white skin; n=58), and were evenly distributed across providers with variable years out of dermatology training (Song et al., 2020). Researchers reported 97.4% of dermatologists counseled patients about sunscreen use during nearly most, if not all, their visits. However, only 46.8% of dermatologists reported that they “sometimes” counseled patients with darker skin types regarding sun protection. The findings from this study were concerning as it was reported that people of color were likely to seek sun protection advice from social websites and popular press such as magazines and websites due to the limited counsel they received from board-certified dermatologists. In fact, this study found that 14 unique websites with sunscreen recommendations were directed to patients with skin of color, of which only two had the input of a board-certified dermatologist, and none represented a medical or scientific source (Song et al., 2020). Although different sunscreens are recommended for different skin types, social websites and popular press typically recommend sunscreens that were chemical, had clear or transparent formulations, and produced in one medium shade, which are too light for skin types V and VI (corresponding to brown to darker brown/black skin tone) (Song et al., 2020). This information does not

accurately reflect sunscreen recommendations for all skin types, which would require sunscreens produced in five to six different color shades and matched to ones' skin tone (Song et al., 2020). Notably, dermatologists in this study did not take skin type into consideration when making sunscreen recommendations. Based on these findings, there is a critical need for dermatologists to increase their attention to sunscreen types and the effects of sun exposure on all skin colors, when counseling patients.

Health-Related Factors Influence and Compliance

Perceptions & Attitudes, Perceived Risk, Behaviors

Children and adolescents are considered defenseless as they heavily rely on their caregivers for skin protection (Thoonen et al., 2019). Broadly speaking, many factors impact parental compliance with the practice of sun protection behaviors for their child. Several studies have targeted parents' attitudes/perceptions of the risk of skin cancer and compliance with sun protection behaviors. Lebbé et al. (2015) identified 864 respondents who had children and who declared their children to be outdoors for at least 10-days per year exposed to the sun. Lebbé et al.(2015) assessed parents about the way in which they protected their children from the sun when the children were young. Researchers found that present-day parents (with children <15 years-old) were more likely than previous generations to use measures of sun protection (i.e., hats (96% vs. 90%, $P < 0.01$), protective clothing (92% vs. 83%), sunscreen (90% vs. 81%) and sunglasses (64% vs. 45) for their children. Notably, Lebbé et al. (2015) acknowledged sunscreen use is more frequent today

than several years ago as more parents have come to develop a greater sense of sun protection awareness.

Nguyen et al. (2021) conducted a cross-sectional study that assessed the attitudes influencing sun protective behaviors and the perception of skin cancer risk among minority groups. In this study, researchers assessed 337 individuals targeting different ethnic subgroups including Chinese and Vietnamese, South Asian, Hispanic, African American, and Filipino patients. Of the target groups, 91.5% of them had type III or higher on the self-reported Fitzpatrick photo-typing scale (corresponding to darker white skin tone to dark brown/black skin tone). The use of sunscreen, sun protective knowledge and behaviors, skin care attitudes and beliefs, healthcare utilization, natural and artificial tanning, and skin care knowledge were assessed. Responses were categorized using a five-point Likert scale or using yes/no responses. Survey items included in this study consisted of: “I believe sunscreen is important to my health, It is worth getting burned to get a tan, How confident are you in your knowledge about skin cancer?, Do you consider sun rays to be the most important factor that can cause skin cancer?, Are you concerned that you will get skin cancer?, What do you think your chances are of developing skin cancer in the future?, How often do you use sunscreen?, Do you know how to find a dermatologist? And lastly, How many times did you get sunburned this past year?”

Researchers found that compared to White participants, Latinos were more concerned about their risk for skin cancer and were 68% more likely to describe sunscreen as important for health after controlling for gender and age (Nguyen et al., 2021). Also, Latino (79%) and Asian (70%) participants were more likely to believe that sun exposure played a role in the onset of skin cancer relative to Whites (Nguyen et al., 2021). Of note was that Eastern Indian/Pakistanis and Asians perceived themselves as having 6 times and 2 times lower than average chance of developing skin cancer in the future relative to white participants, respectively. In fact, Eastern Indian/Pakistanis were more likely to report rarely or never using sunscreen after including gender, generational status, and age as covariates. This is consistent with the lower perceived risk for skin cancer also reported among African American populations (Nguyen et al., 2021). Also, White participants were about four times more likely than Asians or Latinos to know how to find a dermatologist. These findings nicely highlight the differences in perceived skin cancer risk across racial and ethnic groups that serve to influence their behavioral habits in the sun (Nguyen et al., 2021).

Similarly, Pichon et al. (2010) conducted two separate studies with large African American samples. The first of these studies examined perceived risk for skin cancer and sunscreen use. Researchers examined 1932 African American adults; 679 participants were classified as III/IV skin types (darker white skin to light brown skin type) according to The Fitzpatrick's Skin type classification scale. Researchers questioned participants with a brief anonymous health survey that

asked the question: ‘On a scale of 0 to 100, what do you think your chances of getting skin cancer are, where 0 is no chance of getting skin cancer, and 100 means you will definitely get it?’. Sunscreen use was assessed with a Likert-type scale that ranged from ‘Never’ to ‘Always’ by asking: ‘During the summer months, when you are out in the sun for more than 15 minutes, how often do you use sunscreen with a sun protection factor (SPF) of 15 or higher?’ Researchers found that 46% of African Americans reported having zero skin cancer risk and 76% perceived zero or low risk. Unlike White participants, African Americans’ perception of skin cancer risk was not associated with sunscreen use. The lack of a relationship between skin cancer risk perceptions and protective behaviors may reflect African Americans’ low knowledge about the value of sunscreen use. While underestimated and contrary to their beliefs, African Americans with pigmented and colored skin are still among the population that are susceptible to skin cancer.

In the second study, Pichon et al. (2010) focused on the prevalence of sun protection behaviors among a random sample of 2187 African American adults, 745 of whom identified as having III/IV skin type according to The Fitzpatrick’s Skin type classification scale (darker white skin to light brown skin type). Researchers questioned participants with a brief anonymous health survey that asked questions about sun protection behaviors such as sunscreen use with SPF of 15 or greater, wearing sunglasses and wearing a hat with a surrounding brim of at least 2.5 inches: “*During the summer months, how often do you do the following when you are out in the sun for more than 15 minutes?*” Participants had the option

of responding with the Likert-scale response that ranged from ‘Never’ to ‘Always’. Results showed that African American women were three to six times more likely than men to use sunscreen. Notably, the use of sunscreen increased with income and education. Women were also more likely than men to wear sunglasses but 45% less likely to wear wide-brim hats. The results from the Pichon et al. (2010) studies confirmed that African Americans had low perceived risk of skin cancer and low levels of engagement in sun protective behaviors, and, therefore, may be a high risk group that should be targeted for sun safety interventions.

Similarly, Buster et al. (2012) assessed skin cancer risk perceptions among 1246 individuals of multiple races. Among the study sample, 79.9% were White, 12.9% were Hispanic and 9.6% were African American. Other racial/ethnic groups were not analyzed because of a small sample size. Skin cancer risk perceptions was measured using the Health Information National Trends Survey (HINTS) to discover differences in perception that may contribute to disparities in skin cancer diagnosis and treatment. HINTS is a biannual National Cancer Institute cross-sectional survey that assesses Americans’ cancer-related knowledge, attitudes, and behaviors. Participants were asked to respond to a series of questions about skin cancer that included items: ‘Likelihood of future skin cancer (SC; ranging from “very low” to “very high”’, Likelihood of SC compared to the average person of the same age (ranging from “more likely” to “less likely”’, and Worry about SC (ranging from “rarely” or “never” to “all the time”’), There are so many

recommendations about preventing SC it is hard to know which ones to follow ('agree / disagree)' etc.

The results from this study suggested there was a low perceived risk of skin cancer among African Americans, older adults, and those with minimal education (Buster et al., 2012). More notably, African Americans believed that there was little to nothing they could do in terms of engaging in sun protection behaviors to decrease their risk of skin cancer. Similar to African Americans, Hispanics perceived their risk to be low and believed they could not further lower their risk for skin cancer. Further, African Americans believed that they were least susceptible to developing skin cancer in the future and were less concerned about developing skin cancer, compared to White participants. Overall, the literature has consistently identified racial disparities in risk perceptions of skin cancer which is certainly an area that deserves further examination. In a recent study, Kunene et al. (2017) examined the perceptions of 86 African mothers regarding sunscreen protection for their children. Researchers employed questionnaires that focused on the typical sun protection measures and the amount of time their child spent outdoors. Results indicated that most mothers did not adhere to sun protection due to their child's negative feelings about the sun protection equipment, which included a hat, sunscreen, or long sleeve top. Interestingly, 78 of the 86 mothers reported that their children did not like the sun protection resources (i.e., hat or cap, sunscreen, long-sleeved shirt, long pants or trousers or an umbrella) and two-thirds

of mothers reported that the sun protection resources were difficult to utilize. Results suggested that although mothers preferred to use the resources to protect their child's skin, they were not consistently utilized as parents preferred to respect their child's feelings about sun protection equipment and not engage in protective behaviors.

The impact of ethnicity and race on parental attitude and beliefs about sun protection in children was examined in a qualitative study with 22 parents from the UK (Littlewood and Greenfield, 2018). Notably, five parents reported having a child with light brown to dark brown skin complexion. Data collection was achieved with semi-structured interviews for parents with thematic questions surrounding attitudes towards sun protection in children, sun protection behaviors, sun safety knowledge, and motivating and facilitating factors. Parents were motivated by both the long-term risks of sun exposure and the short-term risk of sunburn leading to discomfort (Littlewood and Greenfield, 2018). Although based on a small sample, the results from this study suggested that parents, regardless of race, believed that shielding their children from the sun was vital and they would engage in the necessary behaviors to do so -such as using sunscreen and protective clothing and spending limited time in the sun. Like previous studies, this study also demonstrated parents' knowledge and beliefs about the importance of sun protection for their children as critical in influencing the practice of appropriate sun protection behaviors.

In an effort to further demonstrate the link between knowledge of skin cancer risk and protective behaviors, Meh et al. (2013) assessed sun protection outcomes among African American college students in different geographic locations-- Maryland and Southern California. Students (N=360) were selected from major universities in Maryland and Southern California to complete surveys regarding their knowledge, attitude, and protective behaviors related to sun exposure.

Results from this study showed that California students were more knowledgeable than students from Maryland about skin cancer risks. It is important that students in southern California be aware of their cancer risk due to the state's latitudinal and UV gradient which increases the likelihood of sunburn and skin cancer if exposed. Southern California African American students also reported engaging in sun-protective behaviors (i.e., sunscreen use and protective clothing) more than their Maryland counterparts (Meh et al., 2013). Although Maryland African American students similarly understood the direct link between UV/sun radiation exposure and the occurrence of skin cancer, Southern California students were significantly more knowledgeable about the risk factors of skin cancer (i.e., sunbathing without sunscreen) which was reflected in their increased skin protection habits.

Chapter 2: Rationale

According to Ford (2021), there have been many myths and misconceptions about sun protection for people of color. So much so, many people of color are not taking the necessary precautions to mitigate risk of skin cancer (Ford, 2021). People of color have adopted various misconceptions such as “the sun doesn’t damage their skin”, “people with dark skin do not need to wear sunscreen”, “skin cancer is less common in people of color,” and “skin cancer looks the same in all skin types.” (Ford, 2021). Because many individuals of color have accepted the belief that they are not susceptible to the risk of skin cancer, there are high occurrences of skin cancer at a more advanced stage for minority groups and people of color (Calderón et al., 2019). By modeling appropriate skin care practices when exposed to the sun, parents/caregivers of color may influence their children’s sun protective behaviors and greater knowledge about sun protection measures may increase their likelihood of engaging in protective behaviors for themselves and their child (Diehl et al., 2022).

Several public health agencies and medical groups have emphasized the importance of sun protection behaviors in the reduction of skin cancer risk, The American Academy of Dermatology (AAD, 2021) has strongly advocated for sunscreen protection for skin cancer, as it is one of the most preventable cancers. Similarly, The World Health Organization (2002) has been a strong proponent of greater awareness of sun-protective behaviors to lessen the odds of skin cancer, given that an individual's sun-seeking behaviors result in a greater likelihood of

skin cancer. As researchers have continually pointed out, minority groups fail to consistently engage in sun-protective behaviors (Coups et al., 2012). The poor engagement in health-protective sun behaviors may be due, in part, to the limited information regarding sun safety, specific to minority groups, within public health messaging (Gupta et al., 2016). This further supports the need for improved public health messaging as well as provider education to bring awareness to caregivers and families, particularly those of color, on the urgency of the health hazards of UV radiation and the risk for skin cancer (World Health Organization, 2002).

Although sun protection counseling should be consistently delivered to parents and families by their medical providers, it typically occurs at less-than-optimal rates (Balk et al, 2017). Davy et al. (2002) examined sun protection counseling by pediatricians and found that providers were not delivering the proper information about sun protection to their patients due to time constraints, lack of enthusiasm, and perceived importance of the topic by parents. However, providers can play a critical role in this effort by advocating for the appropriate skin cancer prevention resources for children and families (Gupta et al., 2016). The American Academy of Pediatrics (AAP, 2011) clearly recommends that providers discuss sun protection behaviors with both the parent/child beginning at the age of 9 or 10 years old. As further support, the United States Preventative Services Task Force (2018) recommends provider-delivered behavioral counseling interventions related to pediatric sun protection for parents and families in the clinical setting.

Limited studies have examined the sun protection behaviors of minority groups and children of color which largely requires parental participation. The studies that have examined skin protective behaviors have focused primarily on limited protective measures. Most studies have relied on parental self-report of their child's behavior, which is the standard outcome in pediatric sun exposure research. The proposed study will attempt to determine the rates of provider education/counseling about risks for skin cancer and sun protection during pediatric visits and examine the influence of counseling on parents' attitudes and compliance with sun protection behaviors for their children of color. Factors that influence parents' perceptions and attitudes regarding risk of skin cancer for themselves and their child will be targeted. This study sets itself apart from others as it aims to address barriers for engaging in sun protective behaviors for parents and children of color compared to previous research that has focused its attention on other racial/ethnic counterparts. In addition, this study will highlight the importance of communication between parents and their medical providers about sun protection safety and awareness. With these targets in mind, the following study objectives will be proposed:

Chapter 3: Study Objectives:

1. To determine the proportion of parents of color who receive pediatric sun exposure education/counseling (i.e., skin cancer prevention) from their pediatric providers and rate themselves as satisfied with the information about sun protection and skin cancer prevention.
 1. Few parents of color (<50%) will receive sun protection education from their pediatric providers
 2. Few parents of color (<50%) will rate themselves as satisfied with information discussed with their pediatric provider.
2. To examine factors associated with perceptions of skin cancer risk among parents of color for themselves and their child
 1. Parents of color who have a family history of skin cancer will report greater perceptions of risk for skin cancer for themselves and their children than those with no family history.
 2. Parents of color who receive counseling from their child's provider will report greater perceptions of skin cancer risk for themselves and their children than those who do not receive counseling.
 3. Parents of color who report greater perceptions of skin cancer risk for themselves will report greater perceptions of skin cancer risk for their child.

3. To examine the influence of health-related factors (i.e., counseling from providers, health risk perceptions, and behaviors) on parental compliance with pediatric sun protection guidelines among parents of color
 1. Low overall rates of parental compliance (<50%) with pediatric sun protection guidelines will be reported among parents of color.
 2. Parents of color who have greater perceptions of risk for skin cancer for their child will report greater compliance with pediatric sun protection guidelines.
 3. Parents of color who report receipt of counseling about sun protection/skin cancer prevention will report greater compliance with pediatric sun protection guidelines than those who do not receive counseling.
 4. Parents of color who themselves practice sun protection behaviors will report compliance with pediatric sun protection guidelines (for their child).
 5. Parents of color who identify no barriers related to sun protection behaviors will report greater compliance with pediatric sun protection guidelines than those who report more barriers.

Participants and Setting:

The participants in this study included 43 parents/guardians of color of children of color (ages ≤ 12). This child age range was selected as parents are more likely to be involved in their child's sun-protective behaviors for children at this age

(AAP, 2011). Participants were recruited via the internet and social media platforms such as Facebook, Instagram, and WhatsApp. The parent/guardian who accompanied the child to their medical visits (routine or sick visits) the most often within the past 12 months was asked to complete the survey. Only one parent per family unit completed the survey on behalf of the child. For families with multiple children in the home, the survey responses focused on the youngest child in the home, who was designated as the target child for the study. Children did not participate in the study. The following represent the inclusion and exclusion for the study:

Inclusion criteria: Parents of color of a child of color between the ages of 0-12, who most often accompanies the child to their medical visits over the past 12 months, who can read the study survey, and who is currently living in the United States.

Exclusion criteria: Parents who are not of color, who do not have a child of color, have not frequently accompanied their child to their medical provider in the last 12 months, and whose child has not seen a medical provider in the past year, were all excluded from the study.

Chapter 4: Methods and Procedures

Approval from the Florida Institute of Technology Institutional Review Board (IRB) was obtained before participant recruitment. Parents were prompted to complete an online self-report survey about sun protection education delivered by their child's provider, perception of risk for skin cancer, their child's sun protection practices, and their sun protection behaviors. Information about the survey was distributed via social media platforms. Informed consent was obtained before study enrollment. Participants' names were not collected as part of this study. All data collected was entered into a HIPAA-compliant database that de-identified all personal information and stored on a password-protected server located in the Department of Psychology at Florida institute of Technology. Only authorized researchers had access to this information. The data was saved in such a way that there was minimal risk of participants' confidentiality being breached.

Outcome Measures

The primary outcomes in the current study included:

- A. Receipt of sun protection and skin cancer prevention education from providers: This component was evaluated via two questions regarding whether sun protection and skin cancer risk prevention were discussed by a provider with the parent at any medical visit during the past year. The receipt of information was scored as 'yes/no'. A Follow-up question asked the parent to rate their satisfaction with the information provided. Parents endorsed whether they 'strongly disagreed or strongly agreed'. Parents who

agreed or strongly agreed were considered in the satisfied group. Parents was also asked if their child was ever referred to a dermatologist by their provider due to skin cancer concerns.

- B. Parental perceived skin cancer risk for child and self: This element was assessed with a series of questions: "Protecting my child from the sun is critical in reducing his/her risk for skin cancer": (1) Strongly Disagree, (2) Somewhat Disagree, (3) Somewhat Agree, (4) Strongly Agree. Parents were asked to answer the same question regarding their own protection. Additionally, parents were asked to rate their perceived level of risk for their child/themselves developing skin cancer: "My child's / My risk for developing skin cancer in the future is" (1) no risk, (2) low risk, (3) moderate risk, (4) high risk, or (5) extremely high risk. Separate composite scores ranging from 2 to 9 were developed to assess the parental perceived risk of skin cancer for their child and themselves. A total combined composite score ranging from 4 to 18 was calculated for the parental perceived risk of skin cancer for both their child and them. Higher scores are indicative of higher perceived risk.
- C. Parental compliance with AAP guidelines (Child): The level of compliance with recommended sun protection guidelines was categorized as compliant, partially compliant, or non-compliant. A composite score was calculated for compliance, ranging from 0 to 21, with points being earned for compliance with each of the 5 sun safety factors: wear protective clothing and hats, seek

shade specifically between the hours of 10 am to 4 pm, use extra caution near certain areas (water, snow, sand), apply sunscreen (with an SPF of at least 15), and wear sunglasses -all which are recommended by the AAP. Points were earned for compliance by rating how often parents engaged in each sun safety behavior for their child: (0) never, (1) some days (only when sunny) (2) some days (whether it's sunny or not) (3) most days, and (4) always. An additional yes (0) or no (1) item was added asking the parent "has your child's skin tone changed one shade darker in the past 12 months?"

- D. Parental compliance with AAP guidelines (self): The level of compliance with recommended sun protection guidelines was categorized as compliant, partially compliant, or non-compliant. A composite score was calculated for compliance, ranging from 0 to 21, with points being earned for compliance with each of the 5 sun safety factors --wear protective clothing and hats, seek shade specifically between 10 am and 4 pm, use extra caution near certain areas (water, snow, sand), apply sunscreen (with an SPF of at least 30 as recommended by the AAD for adults), and wear sunglasses, all of which are similar to their child's guidelines. Points were earned for compliance by rating how often parents engaged in each sun protection behavior for themselves (0) never, (1) some days (only when sunny) (2) some days (whether it's sunny or not) (3) most days, and (4) always. An

additional yes (0) or no (1) item was added asking the parent "has your skin tone changed one shade darker in the past 12 months?"

- E. Barriers to compliance: This component was assessed with a series of questions regarding sun protection compliance: "I have barriers that pose as a hindrance to protecting my child from skin cancer risk". The receipt of information was scored as 'yes/no'. A follow-up question asked the parent to identify the barrier that has impacted their compliance the most: (1) Financial cost, (2) Lack of knowledge/awareness, (3) Cultural beliefs, (4) Discomfort, (5) Inconvenience, (6) Forgetfulness, (7) Other reasons, or (8) I have not experienced any barriers.
- F. Demographic Information: Child information collected included age, gender, and race/ethnicity. Child medical information was also collected including previous skincare treatment, medical diagnoses, prescribed medications, and information about the child's visits to their pediatric provider. Parent demographic information collected included age, gender, race/ethnicity, annual household income, and education. Additionally, information about family history of skin cancer, geographic location (the state where the family resides), and season of the year was obtained.

Chapter 5: Research Design and Analysis Plan

This study utilized a cross-sectional design. Data was collected via an online survey, which was published using Qualtrics software program. This survey was available through Florida Institute of Technology's partnership with Qualtrics, and the survey was published on the Qualtrics website. The first page of the survey provided a description of the survey along with an informed consent form. Participants who provided consent were directed to the survey. Participants who declined to provide consent were automatically directed out of the survey. Participants were next asked to verify their eligibility by responding to a set of initial questions. Ineligible participants were automatically directed out of the survey. The complete survey consisted of 59 items and took approximately 15-20 minutes to complete.

Descriptive statistics including standard deviations, means, and frequencies were calculated for both parent and child demographic variables, and for the primary outcomes (parental receipt of sun protection education, family history of cancer, parental compliance with sun protection guidelines, and parental perceived risk for skin cancer). A nonparametric Mann-Whitney U was conducted to compare differences in perceived risk scores and compliance with the sun protection guidelines between parent groups who received or did not receive sun protection/cancer risk counseling from their child's provider. Additionally, the Pearson Product-Moment correlation was conducted to investigate the relationship between parental perceived risk for themselves and their children, and for reports of

compliance with sun protection guidelines between parents and children; Data was analyzed using the Statistical Package for the Social Sciences (SPSS) -- version 28.

Chapter 6: Results

Participants

A total of 76 participants started the online survey for the study. Of these, 26 were excluded because they did not meet the inclusion criteria of being a parent of color of a child of color between the ages of 0-12 or being the parent who most often accompanied the child to their medical visits over the past 12 months. Seven other participants were excluded because they did not complete more than 95% of the survey questions. The final sample consisted of 43 participants, 93% ($n= 40$) of which were between the ages of 26-44, including 40 women. Many participants identified as Black/African American 88.4% ($n= 38$), while ($n= 5$) participants identified as Biracial/Multiracial. Of the total sample, only two participants identified as Hispanic/Latino. See table 1 for additional parent demographic information. Of the parents who chose to provide demographic information, the mean age of their child was 6.23 years old ($SD = 3.26$; range = 0-12 years). The gender distribution of children in the sample was 58% female ($n =25$) and 42% male ($n =18$). Additional demographics of the children sampled are presented in Table 2. Of the total parent sample 60.5% ($n= 26$) identified as having Brown/Dark Brown skin tone, while 44.2% ($n= 19$) of the child sample identified as having Brown/Dark Brown skin tone based on the Fitzpatrick Photo-Typing Scale. Additional information about reported skin tone types based on the Fitzpatrick Photo-Typing Scale is reported in Table 4.

Objective 1 aimed to determine the proportion of parents of color who receive pediatric sun exposure education/counseling (i.e., skin cancer prevention) from their pediatric providers and rate themselves as satisfied with the information about sun protection and skin cancer prevention.

Hypothesis 1.1: Few parents of color (<50%) will receive sun protection education from their pediatric provider

Hypothesis 1.2: Few parents of color (<50%) will rate themselves as satisfied with information discussed with their pediatric provider.

To investigate the percentage of parents of color who received sun protection education/skin cancer risk prevention information and their satisfaction with the information provided by their medical provider, descriptive statistics were utilized. Receipt of sun protection and skin cancer prevention information was coded as 'yes/no'. With a response of 'yes' to either of the two questions posed about sun protection/skin cancer prevention information, 32.6% of parents ($n = 14$) reported receiving sun protection information/skin cancer prevention from their child's medical provider, supporting hypothesis 1.1. Twelve participants reported receiving sun protection information and two participants reported receiving information about sun protection as well as skin cancer prevention. Only 2.3% of parents ($n = 1$) reported that their child was referred to a dermatologist by their child's provider due to skin cancer concerns. Parents reported receiving information from several additional sources. The two most common sources were internet/websites ($n = 27$, 62.8%) and 'other' various sources ($n = 7$, 16.3%). Other sources reported were

books ($n = 1$, 2.3%), brochures ($n = 3$, 7.0%), parent groups ($n = 2$, 4.6%), social media ($n = 2$, 4.7%), and multiple sources from the above listed ($n = 1$, 2.3%).

Parent satisfaction with the information provided by their pediatric medical provider was examined with one question and coded as 1= 'strongly disagree' to 4 = 'strongly agree'. For purposes of analysis, satisfaction was determined by scores of 3 or 4 ('agreed' and 'strongly agreed') on the satisfaction survey item among parents who received information about sun protection/risk for skin cancer from their provider. Within the current study, it was found that 85.7% of parents of color ($n = 12$) rated themselves as satisfied, with the information provided by their pediatric provider, not supporting hypothesis 1.2 as greater than 50% of parents reported satisfaction.

Objective 2 aimed to examine factors associated with perceptions of skin cancer risk among parents of color for themselves and their child.

Hypothesis 2.1: Parents of color who have a family history of skin cancer will report greater perceptions of risk for skin cancer for themselves and their children than those with no family history.

Given the small sample size in this study, only 4% of parents ($n = 2$) reported having a family history of skin cancer. This small sample size did not allow for a group comparison of risk perceptions between those with and without a family history of skin cancer. As such, descriptive statistics were used to examine the parent and child perceived risk variable for the total sample. Parental perceived

risk for skin cancer was evaluated for themselves and their child via two items ranging from (1) 'no risk' to (5) 'extremely high risk' and (1) 'strongly disagree' to (4) 'strongly agree' with possible total scores ranging from 2 to 9. The mean perceived risk endorsed by parents for themselves was 5.56 ($SD = .90$) while the mean perceived risk endorsed by parents for their child was 5.60 ($SD = .87$), indicating overall moderate perceived risk for themselves and their child, respectively.

Hypothesis 2.2: Parents of color who receive counseling from their child's provider will report greater perceptions of skin cancer risk for themselves and their children than those who do not receive counseling.

To investigate the perceptions of skin cancer risk for themselves and their child between parents of color who received counseling and those who did not receive counseling from their pediatric provider, a non-parametric Mann-Whitney U test was conducted due to the small sample size of this study. Parents' receipt of counseling from their child's provider was coded as 'yes/no' based on responses to either of two questions about sun protection/skin cancer prevention information. Two categories were created: parents who received counseling from their provider ($n = 14$) and those who did not receive counseling from their provider ($n = 29$). Perceptions of risk was examined as a continuous variable separately for parents and children with possible scores ranging from 2-9. A composite score combining

parents and child perception of risk scores (family risk) was also calculated with possible scores ranging from 4-18.

A Mann-Whitney U test was conducted to compare the differences in parents' perception of their child's skin cancer risk between parents who received counseling and those who did not receive counseling from their provider.

Perception of risk for skin cancer for their child was not statistically significantly different between parents who received counseling from their child's provider ($Mdn = 6, n=14$) and those who did not receive counseling from their child's provider ($Mdn = 6, n=29$), $U = 160, z = -1.20, p = .229$.

A Mann-Whitney U test was also conducted to compare the differences in parents' perception of their own risk between those who received counseling and those who did not receive counseling from their child's provider. Perception of risk for skin cancer for parents was not statistically significantly different between parents who received counseling from their child's provider ($Mdn = 6, n=14$) and those who did not receive counseling from their child's provider ($Mdn = 6, n=29$), $U = 167, z = -.998, p = .323$.

Finally, the same analysis was conducted to compare the differences in their composite perception of risk scores (computed across risk scores for both parent and child as family risk) between parents who received counseling and those who did not receive counseling from their child's provider. Perception of risk for skin cancer for the child and parent was not statistically significantly different between parents who received counseling from their child's provider ($Mdn = 12, n=14$) and

those who did not receive counseling from their provider ($Mdn = 12, n=29$), $U = 167, z = -.998, p = .323$. The findings did not support Hypothesis 2.2.

Hypothesis 2.3: Parents of color who report greater perceptions of skin cancer risk for themselves will report greater perceptions of skin cancer risk for their child.

To examine the association between parent perceptions of their own and their child's risk for skin cancer, a Pearson product-moment correlation was conducted. There was a statistically significant, positive correlation between parents' perception of risk for skin cancer for themselves, $r(41) = .85, p < .001$, and their perception of risk for skin cancer for their child, supporting hypothesis 2.3.

Objective 3 aimed to examine the influence of health-related factors (i.e., counseling from providers, health risk perceptions, and behaviors) on parental compliance with pediatric sun protection guidelines among parents of color.

Hypothesis 3.1: Low overall rates of parental compliance (<50%) with pediatric sun protection guidelines will be reported among parents of color.

To investigate rates of compliance with pediatric sun protection guidelines among parents of color, descriptive statistics were utilized. Parental adherence to pediatric sun protection guidelines for their child was evaluated via five items assessing sun protection behaviors ranging from (0) 'never' to (4) 'Always' and an additional item that asked about changes in skin tone that was scored as (0) 'yes' or (1) 'no'. Possible scores ranged from 0-21 on the pediatric compliance measure.

Based on the inspection of data among the sample, compliance levels were grouped as low compliance (scores of 0-7), partial compliance (scores of 8-14), and high compliance (scores of 15-21). Due to the small sample size, these categories of compliance were used for descriptive purposes and not included in the analyses.

Within the current study it was found that the mean compliance score for pediatric sun protection guidelines for children was 9.02 ($SD= 4.04$). Twenty-six parents (60.5%) were partially or highly compliant with sun protection guidelines for their child. Twenty-three parents of color reported (53.5%) reported partial compliance. Almost 7% of parents of color ($n= 3$) reported having high compliance with pediatric sun protection guidelines. Hypothesis 3.1 was not supported as a compliance rate of more than 50% were reported. Of the sun protection behaviors reported, many children “always” sought shade/umbrella ($n=8$; 30.8%) and many used caution around snow and sand ($n = 8$; 30.8%). Few children ($n = 3$; 11.5%) ‘always’ used an SPF 15 sunscreen while outdoors. See Table 3 for additional frequencies for child compliance with AAP guidelines. Almost 26% of parents ($n=11$; 25.6%) reported having at least one barrier that posed as a hindrance to engaging in sun protection practices for their child. Barriers that parents reported consisted of lack of awareness ($n= 6$, 14%), cultural beliefs ($n= 1$, 2.3%), inconvenience ($n= 6$, 14%), forgetfulness ($n= 8$, 18.6%), other ($n= 3$, 7%), and multiple reasons from the above listed ($n= 15$, 34.9%).

We also examined parental compliance with sun protection guidelines for themselves with possible scores ranging from 0-21 on the compliance measure; the

mean compliance score for sun protection guidelines for parents was 9.26 ($SD=4.65$). Twenty-two parents of color (51.2%) reported partial compliance with their own sun protection guidelines. Only 14% of parents of color ($n=6$) reported having high compliance with sun protection guidelines.

Hypothesis 3.2: Parents of color who have greater perceptions of risk for skin cancer for their child will report greater compliance with pediatric sun protection guidelines.

To investigate the association between perceptions of risk for child skin cancer and compliance with pediatric sun protection guidelines among parents of color, a Pearson's Product Moment Correlation was conducted. Compliance was examined as a continuous variable with possible scores ranging from 0-21. There was not a statistically significant correlation between parents' perception of risk for skin cancer for their child, $r(41) = .144$, $p = .36$, and their overall compliance with pediatric sun protection guidelines for their child, failing to support hypothesis 3.2.

Hypothesis 3.3: Parents of color who report receipt of counseling about sun protection/skin cancer prevention will report greater compliance with pediatric sun protection guidelines than those who do not receive counseling.

To examine the differences in compliance with pediatric sun protection guidelines between parents of color who received counseling from their child's provider and those who did not, a non-parametric Mann-Whitney U test was conducted. Parents receipt of counseling from their child's provider was coded as 'yes/no' based on responses to either of two questions about sun protection/skin

cancer prevention information. Two categories were created: parents who received counseling from their provider ($n=14$) and those who did not receive counseling from their provider ($n=29$). Compliance was examined as a continuous variable with possible scores ranging from 0-21. Compliance with pediatric sun protection guidelines was not statistically significantly different between parents who received counseling from their child's provider ($Mdn = 9, n= 14$) and those who did not receive counseling from their child's provider ($Mdn = 8, n= 29$), $U = 177.5, z = -.664, p = .507$. Based on these results, Hypothesis 3.3 was not supported.

Hypothesis 3.4: Parents of color who themselves practice sun protection behaviors will report compliance with pediatric sun protection guidelines (for their child).

To examine the association between parents' practice of sun protective behaviors and compliance with pediatric sun protection guidelines for their child, a Pearson product-moment correlation was conducted. Within the current study, the mean compliance score for pediatric sun protection guidelines for children was 9.02 ($SD= 4.04$) while the mean compliance score for sun protection guidelines for parents was 9.26 ($SD= 4.65$) indicating partial compliance with sun protection guidelines. There was a statistically significant, positive correlation between parents' practice of sun protection behaviors for themselves, $r(41) = .78, p < .001$, and their compliance with pediatric sun protection guidelines for their child, supporting hypothesis 3.4.

Hypothesis 3.5: Parents of color who identify no barriers related to sun protection behaviors will report greater compliance with pediatric sun protection guidelines than those who reported more barriers.

To examine the hypothesis that parents who encountered no barriers to sun protection behaviors would report greater compliance with pediatric sun protection guidelines, a non-parametric Mann-Whitney U test was conducted. Parents' endorsement of barriers related to sun protection behaviors was coded as 'yes/no' and participants were categorized as having no barriers ($n= 32$) or experiencing at least one or more barriers ($n= 11$). Compliance was examined as a continuous variable with possible scores ranging from 0-21. Compliance scores were not significantly different between parents who reported no barriers ($Mdn = 8, n=32$) and those who reported barriers related to sun protection behaviors ($Mdn = 9, n=11$), $U = 182.5, z = .182, p = .859$. Therefore, Hypothesis 3.5 was not supported.

Chapter 7: Discussion

Many studies have emphasized the importance of medical providers providing information to parents about sun protection behaviors and skin cancer risk for their child (AAP, 2011), but few have examined these practices among families of color. Most studies have reported low rates (between 23% to 34%) of delivery of sun protection counseling by medical providers to parents in the pediatric setting (Balk et al., 2017). Similarly, Song et al. (2020) found that 46.8% of dermatologists ‘sometimes’ counseled patients with darker skin types regarding sun protection. The results from the current study are consistent with prior findings as 32.6% of parents of color in our sample reported sun protection/skin cancer prevention discussions with their pediatric medical provider. In a study assessing similar outcomes among a non-minority sample, comparable results were obtained with 32.5% of parents reporting they had a discussion with their pediatric medical provider about sun protection and skin cancer risk (Gregson, 2020). Among parents of color in the current study who received information from their child’s provider, the majority of parents reported themselves satisfied with the information their pediatric provider provided them. Collectively, these findings support the critical need for medical providers to continue to address sun protection education/risk counseling and to engage in an ongoing dialogue with individuals of all skin types.

Of note in the current study is that only two participants reported having a family history of skin cancer which did not allow for the examination of whether family history of skin cancer was associated with greater perception of risk for skin

cancer among parents and children of color. However, many studies have found that parents of color and minority groups tend to report low perceived risk for skin cancer (Nguyen et al., 2021). Unlike previous studies, it was found that parents of color in our sample reported moderate perceived risk for skin cancer, based on examination of their overall mean risk perception scores for both themselves and their child. The differences in parents' perceived risk may be due to parents' access to additional sources of information regarding sun protection/skin cancer prevention. Many parents reported the most used sources of information regarding sun protection were the internet/websites and 'other' sources. In addition to receiving information from their medical providers, these findings support previous results that people of color are likely to seek sun protection information from social websites and popular press (i.e., magazines and websites) (Song et al., 2020).

Additionally, parents of color who reported receiving counseling from their pediatric medical provider did not report having greater perception of skin cancer risk for themselves and their child compared to those parents who did not receive counseling. However, parents of color who reported greater perceptions of risk for skin cancer for themselves reported greater perceptions of risk for skin cancer for their child. Relatedly, parents who received counseling about sun protection were not more compliant with recommended sun protection guidelines and greater perceived health risks were not associated with greater compliance. These findings suggest that anticipatory counseling and education about protective behaviors and knowledge about associated health risks alone may not be sufficient to motivate

behavioral change among families of color. Although the quality and intensity of the information shared by providers with parents cannot be determined from this study, results suggest that at minimum, providers should deliver repeated counseling that more strongly conveys the risk associated with not complying with recommended guidelines to protect their child's skin. Consistency of messaging from various sources such as social media platforms (i.e., TikTok, Instagram, and Facebook) may also be needed as parents reportedly turn to social platforms for important content and guidance (Song et al., 2020).

A significant finding from this study was that parents of color did not consistently engage in sun-protective behaviors which was comparable to other studies that showed that minority groups fail to consistently practice behaviors to avoid the sun and protect their skin (Coups et al., 2012). In fact, this study identified 40% of parents were noncompliant with recommended guidelines for their child, most were partially compliant and very few were highly compliant with the AAP guidelines. Lebbé et al. (2015) recognized that sun protective behaviors among minorities are more prevalent now than previous years due to their increased awareness of the importance of sun protection. However, in our sample, few children of color always used sunscreen of SPF 15 or higher when outdoors which is alarming, particularly since this is one of the easier behaviors to ensure protection from the sun and the majority of our sample resided in Florida, where exposure to sun can occur year-round. More children sought shade and avoided snow and sand to protect themselves. This may be because many of the children in

our sample were described to have olive to dark brown skin, thereby minimizing their belief in the need for sunscreen or sun protection (Nguyen et al., 2021). Lebbé et al. (2015) also found that parents of color were more likely to have their child wear hats and protective clothing rather than wear sunscreen and sunglasses for sun protection; however, not many children in our sample always engaged in these protective measures.

Although endorsement of barriers was not associated with compliance, almost 26% of parents in our sample reported experiencing at least one barrier to engaging in sun protective behaviors such as inconvenience, forgetfulness, and lack of awareness. Encouraging parents to schedule time in the family routine to administer sunscreen, require their child to wear a hat or sunglasses before they step outdoors, along with reminders on a calendar, cell phones or other device may serve to alert parents to monitor their child's practices and increase compliance with positive sun behaviors. At a systems level, enforcing policy and regulations at school and at local childcare facilities may affect parental compliance as parents would be mandated to comply with the guidelines in order to avoid repercussions, local penalties, or critical judgment of their parenting.

The positive association between parents' practice of sun protective behaviors and adherence to recommended sun protection guidelines for their child suggests that parents may serve as role models for their child's behavior so that addressing parental behavioral practices may be equally important as addressing children's practices. Family-based interventions for sun exposure may be an

effective option for simultaneously promoting behavioral change in both parents and their children. Family-based interventions that involve face to face sessions and motivational interviewing have been found to be effective with other behavioral health outcomes (i.e. management of childhood obesity) and family engagement has been identified as a predictor of better treatment adherence (Rojo et al., 2022). Researchers have recommended that providers discuss sun protection behaviors with both the parent/child beginning at the age of 9 or 10 years old (AAP, 2011). As USPSTF (2018) reported, provider-delivered behavioral counseling interventions in the clinical setting are highly recommended. Promoting more consistent family engagement in sun protection/risk counseling activities of families of color may be a critical next step in the healthcare setting.

Chapter 8: Limitations of Study and Areas of Future Research

Our study findings should be interpreted with caution because of the small sample size. Some of the reasons for a small sample size may be low willingness and poor response rate from potential participants, and lack of entry to representative Facebook groups to recruit participants. Although small, the study sample size was comparable to the size of other samples focusing on people of color potentially because of similar issues. Miller et al. (2015) identified possible reasons of limited parental enrollment in health behavior studies involving children of color, which may be due to the many cultural and linguistic barriers families of color face as well as the lack of access to healthcare and mistrust of the medical system. As such, future health-based studies should consider speaking directly to parents to build comfort and trust to facilitate participation rather than sending impersonal survey links. Also, compensation for the time and effort parents take to accurately complete the survey may help in increasing enrollment of minority groups.

There are additional limitations for this current study that are inherent in pediatric sun protection research. Foremost, the primary outcomes in the current study are based exclusively on parent self-report. It is possible that parents may have misreported information about sun protective behaviors, including sunscreen use, for their children due to lack of interest and fear of judgment of not being a good parent. Also, parents' recollection of their experience with their provider may not represent an accurate depiction of what information providers have delivered,

which is likely to affect the rates of parental receipt of information. It is possible that the parents/guardians who do not typically take their child to their medical visits and manage their child's sun protective behaviors completed the survey. Future studies should consider including a provider account of the interaction with parents during medical visits to supplement parental reports.

Lastly, multiple parent and school groups on Facebook denied the researchers permission to share this study's survey on their page, which limited the global access of parents. This ultimately limited the ability to gather information from parents from various states such that participants were localized to the state of Florida. To add, the majority of participants in the study were females, representing the typical composition of many parent groups, which may limit participation from fathers who take an active role in the child's healthcare.

Tables

Table 1

Descriptive Statistics for Parental Demographic Variables for the Total Sample (N=43)

Variable	n (%)
Gender	
Male	3 (7.0%)
Female	40 (93.0%)
Age	
18-25	1 (2.3%)
26-44	40 (93.0%)
45-59	2 (4.7%)
Race	
Black/African American	38 (88.4%)
Biracial/Multiracial	5 (11.6%)
Ethnicity	
Hispanic/Latino	2 (4.7%)
Non-Hispanic/Latino	41 (95.3%)
Education	
High School Diploma	7 (16.3%)
GED/Technical Degree/Certificate	3 (7.0%)
Associate's degree	11 (25.5%)
Bachelor's Degree	10 (23.3%)
Master's Degree	10 (23.3%)
Doctoral Degree	2 (4.6%)
Income	
\$0-19,000	1 (2.3%)
\$20,000-39,000	10 (23.3%)
\$40,000-59,000	16 (37.2%)
\$60,000-79,000	10 (23.3%)
\$80,000-\$99,000	5 (11.6%)
\$120,000 and over	1 (2.3%)
State	
Arkansas	1 (1.3%)
Florida	32 (42.1%)
Georgia	1 (1.3%)
Maryland	1 (1.3%)
North Carolina	2 (2.6%)
Texas	1 (1.3%)
Virginia	5 (6.6%)
Patient Relationship with Provider	
0-6 months	3 (7.0%)
6 months- 1 years	3 (7.0%)
1-2 years	11 (25.6%)
2-5 years	12 (27.9%)
5-10 years	11 (25.5%)
More than 10 years	3 (7.0%)
Receipt of Education	(n=14)
Sun Protection	12 (85.7%)
Skin Cancer Prevention	2 (14.3%)

Note. Some parents elected not to provide specific demographic information such that frequencies may not reflect the total sample

Table 2*Descriptive Statistics for Child Demographic and Medical Variables for the Total Sample (N=43)*

Variable	n (%)
Gender	
Male	18 (41.9%)
Female	25 (58.1%)
Age	
0-11 months	5 (11.6%)
1-3 years	16 (37.2%)
4-7 years	13 (30.2%)
8-12 years	9 (21.0%)
Medical/Psychological Diagnoses	(n=11)
Attention-Deficit/Hyperactivity Disorder (ADHD)	1 (9.1%)
Asthma	2 (18.1%)
Allergies to pollen	1 (9.1%)
Cerebral Palsy	1 (9.1%)
Umbilical Hernia	1 (9.1%)
Eczema	5 (45.5%)
Skin Cancer Treatment	(n= 9)
Eczema	8 (88.9%)
Hand, Mouth, and Foot Disease	1 (11.1%)
Average Number of Days Spent with Parent/Guardian	
2-4 days	1 (2.3%)
5-7 days	42 (97.7%)

Note. Some parents elected to not provide specific information such that total sample may not reflect the total sample for parent sample.; some children had multiple medical/psychological diagnoses.

Table 3

Frequency of Child's Compliance with AAP Guidelines for Sun Protection (Endorsed "Always").

Variable	n= 26
Protective clothing outdoors	2 (7.7%)
Seek shade/umbrella (10-4)	8 (30.8%)
More caution near snow/sand	8 (30.8%)
Sunscreen SPF 15	3 (11.5%)
Sunglasses outdoors	5 (19.2%)

Note. Some parents elected to not provide specific information such that frequencies may not reflect the total sample.
n(%)= Parents 'Always' endorsed

Table 4

Reported Skin Tone for Parent and Child Based on Fitzpatrick Photo-Typing Scale

Variable	Adult	Child
	n=43 (%)	n=43 (%)
Medium/White to Olive Skin	1 (2.3%)	5 (11.6%)
Olive/Moderate Brown Skin	15 (34.9%)	19 (44.2%)
Brown/Dark Brown Skin	26 (60.5%)	19 (44.2%)
Very Dark Brown to Black Skin	1 (2.3%)	

References:

Altieri et. al. (2018). Prevalence of Sun Protection Behaviors in Hispanic Youth Residing in a High UV Environment. *Pediatr Dermatol.* 35(1): e52–e54. doi:10.1111/pde.13299.

American Academy of Dermatology (AAD). (2022). American Academy of Dermatology Association. Retrieved October 18, 2022 from <https://www.aad.org/media/stats-skin-cancer>

American Academy of Pediatrics Ultraviolet Radiation: A Hazard to Children and Adolescents (AAP Policy Statement) (2011, Feb 28). Retrieved November 26, 2021, from <https://pediatrics.aappublications.org/content/127/3/588>

American Cancer Society. (2022). Retrieved November 15, 2021, from <https://www.cancer.org/research/acs-research-highlights/skin-cancer-research-highlights.html>
<https://www.cancer.org/cancer/melanoma-skin-cancer/about/what-is-melanoma.html>

<https://www.cancer.org/cancer/basal-and-squamous-cell-skin-cancer.html>

American Cancer Society. *Cancer Facts & Figures 2022*. American Cancer Society. Atlanta, Ga. 2021.

Balk, S. J., Gottschlich, E. A., Holman, D. M., & Watson, M. (2017). *Counseling on Sun Protection and Indoor Tanning. Pediatrics, 140(6), e20171680.*
doi:10.1542/peds.2017-1680

Bradford PT. (2009). Skin Cancer in Skin of Color. *Dermatol Nurs.* Jul
Aug;21(4):170-7, 206; quiz 178. PMID: 19691228; PMCID: PMC2757062.

Buster, K. J. et al. (2012). Skin cancer risk perceptions: A Comparison Across
Ethnicity, Age, Education, Gender, and Income. *Journal of the American
Academy of Dermatology, 66(5), 771–779.*
<https://doi.org/10.1016/j.jaad.2011.05.021>

Calderón, T. et. al. (2019). Correlates of Sun Protection Behaviors in Racially and
Ethnically Diverse U.S. Adults. *Preventive Medicine Reports.* Volume 13,
Pages 346-353, <https://doi.org/10.1016/j.pmedr.2018.12.006>.

Correnti et. al. (2018). Racial Disparities in Fifth-Grade Sun Protection: Evidence
from the Healthy Passages Study. *Pediatr Dermatol.* 35(5):588-596. DOI:
10.1111/pde.13550. Epub 2018 Jul 2. PMID: 29962040; PMCID:
PMC6168341.

Coups et. al. (2012). Sun Protection and Exposure Behaviors Among Hispanic Adults in the United States: Differences According to Acculturation and Among Hispanic Subgroups. *BMC Public Health*. 12:985. DOI: 10.1186/1471-2458-12-985. PMID: 23153104;PMCID: PMC3533808.

Danysh, H. et. al, (2019). Malignant Melanoma Incidence among Children and Adolescents in Texas and SEER 13, 1995-2013. *Pediatr Blood Cancer*. 66(6):e27648. doi: 10.1002/pbc.27648. Epub 2019 Feb 7. PMID: 30729662; PMCID: PMC6472974.

Davy et. al. (2002). Sun Protection Counseling by Pediatricians. *Ambulatory Pediatric* 2002;2:207 211. [https://doi.org/10.1367/15394409\(2002\)002<0207:SPCBP>2.0.CO;2](https://doi.org/10.1367/15394409(2002)002<0207:SPCBP>2.0.CO;2)

Deneve JL, Messina JL, Marzban SS, Gonzalez RJ, Walls BM, Fisher KJ, Chen YA, Cruse CW, Sondak VK, Zager JS. Merkel cell carcinoma of unknown primary origin. *Ann Surg Oncol*. 2012 Jul;19(7):2360-6. doi: 10.1245/s10434-011-2213-2. Epub 2012 Jan 21. PMID: 22271206; PMCID: PMC4504007.

Dermatology. (2021). Retrieved November 15, 2021, from

<https://www.aad.org/public/diseases/skin-cancer/types/common/melanoma/skin-color>

<https://www.aad.org/public/diseases/skin-cancer/prevent/sun-protection>

Diehl, K.; Thoonen, K.; Breitbart, E.W.; Pfahlberg, A.B.; Görig, T. (2022) Sun Protection and Tanning Behaviors in Caregivers: Prevalence, Determinants, and Associations with Children's Behaviors. *Int. J. Environ. Res. Public Health*, 19, 6876. <https://doi.org/10.3390/ijerph19116876>

Dixon, H., Borland, R., & Hill, D. (1999). *Sun Protection and Sunburn in Primary School Children: The Influence of Age, Gender, and Coloring*. *Preventive Medicine*, 28(2), 119–130. doi:10.1006/pmed.1998.0392

Ford H. (2021) Myths vs. Facts: Do People of Color Need Sunscreen & Sun Protection? *General Health, Prevention*.
<https://blog.uvahealth.com/2021/06/10/people-of-color-sun-protection/>

Fuzzell, et. al. (2018). Parents' Adherence to Pediatric Health and Safety Guidelines: Importance of Patient-Provider Relationships. *Patient Education and Counseling* 101 (2018) 1570–1576.
<https://doi.org/10.1016/j.pec.2018.05.003>

- Gregson, S. (2020). *Pediatric Sun Protection Education in Primary Care: Parental receipt, compliance, and skin cancer risk*. [Unpublished doctoral dissertation]. Florida Institute of Technology.
- Gupta, A. et. al (2016). Skin Cancer Concerns in People of Color: Risk Factors and Prevention. *Asian Pacific journal of cancer prevention: APJCP*, 17(12), 5257–5264. <https://doi.org/10.22034/APJCP.2016.17.12.5257>
- Guy, G. et. al., (2015). Vital Signs: Melanoma Incidence and Mortality Trends and Projections The United States, 1982-2030. *MMWR. Morbidity and Mortality Weekly Report*. 64. 591 6.
- Holman D., et. al., (2019). Clinical Counseling on Sun Protection and Indoor Tanning Avoidance: A Survey of Current Practices among U.S. Health Care Providers. *Prev Med*. 126:105783. doi: 10.1016/j.ypmed.2019.105783. Epub 2019 Jul 17. PMID: 31325525; PMCID: PMC6697604.
- Huang J. et. al. (2019). Risk Factors and Outcomes of Nonmelanoma Skin Cancer in Children and Young Adults. *J Pediatr*. 211:152-158. DOI: 10.1016/j.jpeds.2019.04.017. Epub 2019 May 15. PMID: 31103258; PMCID: PMC7916541.

Hunter et. al. (2010). Assessment of Elementary School Students' Sun Protection Behaviors. *Pediatr Dermatol.* 27(2):182-8. doi: 10.1111/j.1525-1470.2009.00940.x. Epub 2009 Jul 20. PMID: 19686304; PMCID: PMC3683831.

Kunene, Z., et. al. (2017). 'My Child did not like using Sun Protection': Practices and Perceptions of Child Sun Protection among Rural Black African Mothers. *BMC Public Health.* 25;17(1):677. DOI: 10.1186/s12889-017-4688-7. PMID: 28841823; PMCID: PMC5574151.

Lebbé C, et. al., (2015). Evolution of Sun-Protection Measures for children. *J Eur Acad Dermatol Venereol.* 29 Suppl 2:20-2. doi: 10.1111/jdv.12898. PMID: 25639929.

Littlewood, Z. & Greenfield, S. (2018) Parents' Knowledge, Attitudes and Beliefs Regarding Sun Protection in Children: A Qualitative Study. *BMC Public Health.* 18(1):207. DOI:10.1186/s12889-018-5091-8. PMID: 29391005; PMCID: PMC5796497.

Meh, C., Gill, J.K., & Kim, D.H. (2013). Comparison of Skin Cancer Knowledge, Attitude, and Protective Behavior in African American Students in East and West Coasts. *The Canadian Journal of Hospital Pharmacy,* 11, 25-35.

Miller et. al. (2021). Sun Protection Changes Among Diverse Elementary Schoolchildren Participating in a Sun Safety Intervention: A latent transition analysis of a randomized controlled trial. *Prev Med.*149:106601. doi: 10.1016/j.ypmed.2021.106601. Epub 2021 May 7. PMID: 33971211; PMCID: PMC8195865.

Miller et. al. (2015). Patterns of Sun Protective Behaviors among Hispanic Children in a skin Cancer Prevention Intervention. *Prev Med.* 81: 303–308. doi:10.1016/j.ypmed.2015.09.027.

Nguyen, A. et. al. (2021). Attitudes and Behaviors Regarding Sun-Protection Practices Among Minority Groups in Lower Socioeconomic Community. *Research Square*. DOI: <https://doi.org/10.21203/rs.3.rs-153191/v1>

Patel AR, Zaslow TL, Wren TAL, Daoud AK, Campbell K, Nagle K, Coel RA. (2019) A Characterization of Sun Protection Attitudes and Behaviors Among Children and Adolescents in the United States. *Prev Med Rep.* 9;16:100988. doi: 10.1016/j.pmedr.2019.100988. PMID: 31660287; PMCID: PMC6807366.

Pichon, L. C., Corral, I., Landrine, H., Mayer, J. A., & Adams-Simms, D. (2010).

Perceived Skin Cancer Risk and Sunscreen Use among African American Adults. Journal of Health Psychology, 15(8), 1181–1189.

doi:10.1177/1359105310364177

Pichon, L. C., Corral, I., Landrine, H., Mayer, J. A., & Norman, G. J. (2010). *Sun*

Protection Behaviors Among African Americans. American Journal of

Preventive Medicine, 38(3), 288–295. doi:10.1016/j.amepre.2009.10.041

Rahib L, Wehner MR, Matrisian LM, Nead KT. (2021) Estimated Projection of US

Cancer Incidence and Death to 2040. JAMA Netw Open.4(4):e214708. doi:

10.1001/jamanetworkopen.2021.4708. PMID: 33825840; PMCID:

PMC8027914.

Rojo M, Lacruz T, Solano S, Gutiérrez A, Beltrán-Garrayo L, Veiga OL, Graell M,

Sepúlveda AR. (2022). Family-reported barriers and predictors of short

term attendance in a multidisciplinary intervention for managing childhood

obesity: A psycho-family-system based randomised controlled trial

(ENTREN-F). Eur Eat Disord Rev.30(6):746-759. doi: 10.1002/erv.2913.

Epub 2022 May 28. PMID: 35644038; PMCID: PMC9796111.

Sangha AM. Dermatological Conditions in SKIN OF COLOR-A Look at Skin Cancer in Skin of Color. *J Clin Aesthet Dermatol.* 2022 Jun;15(6 Suppl 1):S17-S18. PMID: 35784448; PMCID: PMC9197150.

Song, H., et. al., (2020). Sunscreen Recommendations for Patients with Skin of Color in the Popular Press and in the Dermatology Clinic. *Int J Womens Dermatol.* ;7(2):165-170. doi: 10.1016/j.ijwd.2020.10.008. PMID: 33937484; PMCID: PMC8072489.

Thoonen, K. et. al. (2019). Childhood Sun Safety at Different ages: Relations between Parental Sun Protection Behavior Towards their Child and Children's own Sun Protection Behavior. *BMC Public Health.* 19. 10.1186/s12889-019-7382-0.

U.S. Preventive Services Task Force (USPSTF). (2018). Behavioral Counseling to Prevent Skin Cancer US Preventive Services Task Force Recommendation Statement. *JAMA.* Volume 319(11):1134-1142. doi:10.1001/jama.2018.1623

World Health Organization (WHO). (2002). Helping People Reduce their Risks of

Skin Cancer and Cataract: A practical Guide for using the global solar UV

index. Retrieved November 26, 2021, from

<https://www.who.int/news/item/22-07-2002-helping-people-reduce-their-risks-of-skin-cancer-and-cataract>

Appendix A: Letter of Information and Informed Consent

Primary Investigator:

Williana Magloire, M.S, M.S.
Department of Psychology, Florida Institute of Technology (E):
wmagloire2019@my.fit.edu

Co-Investigator:

Vida L. Tyc, PhD.
Department of Psychology, Florida Institute of Technology

Purpose of the Study

The purpose of this study is to learn more about sun protection behaviors among parents/guardians of color and their children, while gaining information about parents' perceptions about sun protection and skin cancer risk. We will be exploring factors that may influence whether individuals use sun protection for themselves and/or their children. We will ask you about your relationship with your child's medical provider and about information he/she has provided you at your child's medical visit. This information will help us determine provider rates for delivering sun protection information and patterns of sun protection behaviors among children and their parents/guardians.

Eligibility

To participate, you must be a parent/guardian of color with a child of color < 12 years of age. Additionally, you must be 18 years of age or older, able to read and write English fluently and live in the United States. Only one parent per family can complete the survey on behalf of the child. The parent who completes the survey should be the parent who has most frequently accompanied their child to their pediatric medical visits in the last 12 months. If there is more than one child in the family, parents will be asked to complete the survey for the youngest child in the family.

Procedures of the Study

If you are eligible to participate in the study, you will be asked to complete an online survey. Please The survey will consist of questions regarding you and your child's past and current sun protection behaviors, you and your child's medical history, as well as your relationship with your child's medical provider. You will be able to adjust any of your responses by pressing the "Back" button to return to the

previously completed page. We estimate that the questionnaire will take approximately 15- 20 minutes to complete.

Compensation

This project will not include any compensation.

Potential Risks and Benefits

The risks of participating in this study are minimal and unlikely. However, you will be asked questions about your sun protection behaviors and your child's sun protection behaviors, as well as questions regarding skin cancer, which you may find stressful. You may choose not to respond to any question that makes you uncomfortable and are free to discontinue your participation at any point during the study. While unlikely, there is a risk of loss of privacy. We will keep your study information private and confidential and all data will be de-identified and kept in a database that only researchers have access to. There will be no direct benefits to you by taking part in this study. However, the information obtained from this study may be used to help other parents/guardians in the future.

Discontinuation of the Study

Participation in this study is voluntary. You are under no obligation to participate in this study, and you are free to discontinue the study at any time without consequences to you. There is no penalty for not participating. You may refuse to answer any questions that we ask you. If you decide to withdraw from the study, the information provided by you will not be retained.

Confidentiality

All responses obtained from you will be kept confidential. No identifying information will be collected during this survey. All data collected will be entered into a HIPAA-compliant database and stored on a password-protected server located in the Department of Psychology at Florida Institute of Technology. Only authorized researchers will have access to this information.

Information about Study Participation

Any questions about study participation may be directed to Williana Magloire (Principle Investigator) at wmagloire2019@my.fit.edu

This study has been reviewed and approved by the Institutional Review Board at Florida Institute of Technology. If you have any questions or concerns about the study, these may be directed to:

Dr. Jignya Patel, Chair of the Institutional Review Board Institutional Review Board Office, School of Psychology 150 W University Blvd
Melbourne, Florida, 32901

(P): 321-674-7347 (E): FIT_IRB@fit.edu

Consent

In order to keep your information confidential, your name or signature is not required. Please indicate your choice below. Should you choose to participate, you will be directed automatically to the survey.

- I have read the information presented above about a study being conducted by Williana Magloire (Principle Investigator) of the School of Psychology at Florida Institute of Technology. I am 18 years or older, and I understand that I may withdraw from the study at any time. I agree to participate in this study.
- I have read the information presented about this study and I do not wish to participate.

Appendix B: Survey

1. Are you 18 years of age or older currently living in the United States?
 - Yes
 - No
2. Are you a parent of color?
 - Yes
 - No
3. Do you have a child of color ≤ 12 years old?
 - Yes
 - No
4. Has your child seen a medical provider in the past year?
 - Yes
 - No
5. Are you the parent/guardian who has most often accompanied your child to their pediatric medical visits over the past 12 months?
 - Yes
 - No

Please answer the following questions as they pertain to you as the Parent/Guardian

6. What is your current age?
 - _____
7. What gender do you identify with?
 - Female
 - Male
 - Transgender
 - Nonbinary
8. What is your race?
 - Black/African American
 - Asian/Asian American
 - American Indian/Alaskan Native
 - Hawaiian Native/Other Pacific Islander
 - Biracial/Multiracial
 - Other: _____
9. What is your ethnicity?
 - Hispanic/Latino
 - Non-Hispanic/Latino
10. What state do you currently reside in?
 - _____
11. What is the current season?

- Winter
- Spring
- Summer
- Autumn/Fall

12. What is your approximate individual total annual income (before taxes)?

- \$0-\$19,000
- \$20,000-\$39,000
- \$40,000-\$59,000
- \$60,000-\$79,000
- \$80,000-\$99,000
- \$100,000-\$119,000
- \$120,000 and over

13. What is your highest level of education completed?

- I did not graduate high school
- High school diploma
- GED/ Technical Degree/Certificate
- Associate's Degree
- Bachelor's Degree
- Master's Degree
- Doctoral Degree

14. Does your family have a history of skin cancer?

- Yes
- No

15. Please select one of the following statements that best applies to you:



- **I have medium/white to olive skin**
- **I have olive/ moderate brown skin**
- **I have brown/ dark brown skin**
- **I have very dark brown to black skin**

16. How many children do you have?

- 1
- 2

- 3
- 4 or more _____

Please answer the following questions about your child. If multiple children, please respond to the survey questions based on your youngest child, age \leq 12-years old

17. What is your child's current age?

- _____

18. What gender does your child identify with?

- Female
- Male
- Transgender
- Nonbinary

19. What is your child's race?

- Black/African American
- Asian/Asian American
- American Indian/Alaskan Native
- Hawaiian Native/Other Pacific Islander
- Biracial/Multiracial
- Other: _____

20. What is your child's ethnicity?

- Hispanic/Latino
- Non-Hispanic/Latino

21. How many days per week do you spend with your child during a typical week?

- _____

22. In what state does your child currently reside?

- _____

23. Has your child ever received any skincare treatment?

- Yes
 - If yes, please list any related skin diagnoses and treatments below

- No

24. Has your child ever experienced any negative skin reactions to the sun in the past?

- Yes

- If yes, please specify negative side effects/ skin reactions to the sun below

No

25. Has your child received any medical diagnoses?

Yes (Please list below)

- _____

No

26. Is your child currently on any medication?

Yes (Please list below with dosage if known)

- _____

No

27. Please select one of the following statements that best applies to your child:



- He/she has medium/white to olive skin and tans easily**
- He/she has olive/moderate brown skin tans darkly easily**
- He/she has brown/ dark brown skin and always tans darkly**
- He/she freckles easily**
- He/she has many moles or atypical moles**

28. How long has your family worked with/has had a relationship with the child's current pediatric medical provider (Please indicate by checking one)

- 0-6 months
- 6 months – 1 year
- 1-2 years
- 2-5 years
- 5-10 years
- More than 10 years

- 29. Has your child's medical provider discussed with you any information regarding sun protection at any visit during the past year?**
- Yes
 - No
- 30. Has your child's medical provider discussed skin cancer prevention with you at any visit during the past year?**
- Yes
 - No
- 31. Has your child ever been referred to a dermatologist by their provider due to skin cancer concerns?**
- Yes
 - No
- 32. In general, I am satisfied with the information I receive from my child's medical provider**
- Strongly Disagree
 - Somewhat Disagree
 - Somewhat Agree
 - Strongly Agree
- 33. I understand the information my child's medical provider gives me about guidelines to follow for my child's health care**
- Strongly Disagree
 - Somewhat Disagree
 - Somewhat Agree
 - Strongly Agree
- 34. I feel comfortable asking my child's provider about sun protection guidelines**
- Strongly Disagree
 - Somewhat Disagree
 - Somewhat Agree
 - Strongly Agree
- 35. I felt as though I had enough time to ask questions during my child's medical visits**
- Strongly Disagree
 - Somewhat Disagree
 - Somewhat Agree
 - Strongly Agree
- 36. I felt as though my child's provider was a good source of information**
- Strongly Disagree

- Somewhat Disagree
- Somewhat Agree
- Strongly Agree

37. I felt comfortable asking general questions during my child's medical visits

- Strongly Disagree
- Somewhat Disagree
- Somewhat Agree
- Strongly Agree

38. Protecting myself from the sun is critical in reducing my risk for skin cancer.

- Strongly Disagree
- Somewhat Disagree
- Somewhat Agree
- Strongly Agree

39. Protecting my child from the sun is critical in reducing his/her risk for skin cancer.

- Strongly Disagree
- Somewhat Disagree
- Somewhat Agree
- Strongly Agree

40. My risk for developing skin cancer in the future is:

- No risk
- Low risk
- Moderate risk
- High risk
- Extremely high risk

41. My child's risk for developing skin cancer in the future is:

- No risk
- Low risk
- Moderate risk
- High risk
- Extremely high risk

42. How often does your child wear protective clothing (e.g long sleeve shirt/pants) and hats while outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

43. How often does your child seek shade (or use an umbrella) while outdoors during the hours between 10 am and 4 pm?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

44. How often does your child protect themselves from sun exposure while outdoors near water, snow, and/or sand?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

45. How often does your child apply sunscreen with an SPF of at least 15 when outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

46. How often does your child wear sunglasses outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

47. Has your child's skin tone changed one shade darker in the past 12 months?

- Yes
- No

Please answer the following questions as they pertain to you as the Parent/Guardian

48. How often do you wear protective clothing (e.g long sleeve shirt/pants) and hats while outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

49. How often do you seek shade while outdoors during the hours between 10 am and 4 pm?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

50. How often do you protect yourself from sun exposure while outdoors near water, snow, and/or sand?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

51. How often do you apply sunscreen with an SPF of at least 30 when outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days
- Always

52. How often do you wear sunglasses outdoors?

- Never
- Some days (only when sunny)
- Some days (whether it's sunny or not)
- Most days

- Always

53. Has your skin tone changed one shade darker in the past 12 months?

- Yes
- No

54. Please select one of the following which describes your sun protection practices for your child

- I have experienced at least one barrier that poses as a hindrance to engaging in sun protection practices for my child
- I have experienced no barriers that pose as a hindrance to engaging in sun protection practices for my child

55. Please check which of the following have impacted your sun protection practices (e.g. use of sunscreen; wear protective clothing, etc) for your child: Please check all that apply

- The financial cost of sunscreen or sun protection products
- Lack of knowledge/awareness of sun protection habits
- Cultural beliefs (please describe.....)
- Discomfort with wearing sunscreen or using sun protection products (my own discomfort or my child's)
- Inconvenience
- Forgetfulness
- Other: _____
- None of the above

56. Please check which of the following statements you agree with. Please check all that apply.

- The sun does not harm people of color's skin.
- People with dark skin do not need to wear sunscreen.
- Skin cancer is less common in people of color.
- Skin cancer looks the same in all skin types
- People of color do not sunburn
- Sunscreen use (spray on and/or lotion) does not last on people of color's skin.
- Sunscreen leaves white residue on people of color's skin.
- The chemicals or minerals in sunscreen cause more harm and damage to pigmented skin than sun exposure.

- Selecting the type of sunscreen to use (i.e... broad spectrum 30 and 50 SPF) is confusing.
- People of color are not at risk for skin cancer.
- Use of sunscreen is not necessary on cloudy days

57. Please check sources of information about sun protection you have utilized: Please check all that apply.

- Internet/Websites
- Books
- Brochures
- Parent Groups
- Social Media
- Other: _____

58. After completing this survey, do you feel more compelled to engage in sun protection behaviors for yourself? If so, which behaviors?

- Yes _____
- No

59. After completing this survey, do you feel more compelled to engage in sun protection behaviors for your child? If so, which behaviors?

- Yes _____
- No