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Sun Protection Counseling by Pediatricians has Little Effect on Parent and Child Sun Protection Behavior

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Abstract

Objective—To compare counseling concerning sun protection and outdoor exercise with the parent’s report of the behavior of a child age 9 to 16 years old.

Study design—Structured interviews of medical personnel in three Chicago area practices elicited information about counseling methods and recommendations. In each practice, a convenience sample of parents completed a self-reported survey of their and their child’s behavior.

Results—Sun protection counseling occurred more frequently than exercise counseling in all practices ($p=0.014$). Sun protection counseling was associated with parental prompting ($p=0.004$), performing a summer camp physical ($p=0.002$), and the child having a sunburn ($p=0.003$). After controlling for the child’s age, sex, and skin tone, sun protection counseling was not associated with the child’s use of sun protection. In multivariate analysis of the child’s sun protection behavior, parental sunburns, indoor tanning in the last 12 months, perception of skin cancer risk and sun protection self-efficacy were significant. ($p=.02$) Children who pursued outdoor sports were twice as likely to use inadequate sun protection and sustain sunburns. (CI 1.3–1.7)

Conclusions—The child’s sun protection behavior was influenced by parental sun protection, parental perception of skin cancer risk and parental sun protection self-efficacy; therefore, sun protection for children needs to be aimed at parents as well as children. Communication with parents in a way that incorporates the principles of motivational interviewing may be more effective in promoting behavioral change than admonitions to use sunscreen.

Keywords

Skin cancer prevention; outdoor exercise; sun protection; counseling by pediatricians

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Unprotected sun exposure, a risk for the development of skin cancer, is one of the reasons that between 1 and 3 million people were diagnosed with non-melanoma skin cancer (NMSC) in the United States (US) in 2010. (1–3) Melanoma incidence increased by 2.4% annually from 1975–2002, and is associated with childhood sun exposure. (4, 5) Both NMSC and melanoma can be prevented by the regular use of sunscreen with a sun protection factor (SPF) of 15 or greater. (6, 7) The American Academy of Pediatrics recognized that childhood and adolescence are critical periods of vulnerability; thus, childhood seems to be the ideal time to intervene to establish sun protective behaviors to prevent the subsequent development of skin cancer. (8) Despite this vulnerability, children learn to desire a tan and reduce the use of sunscreen between fifth and eighth grades. (9) Beginning in early adolescence, the use of sun protection steadily declines and reaches its lowest levels by high school and young adult years. (10, 11)

In 2011, the US Preventive Services Task Force recommended sun protection counseling by primary care physicians for children and adolescents at risk to sunburn. (12) Sun protection consists of wearing sun-protective clothing when exposed to sunlight, using sunscreen with a SPF of 15 or higher, seeking shade, limiting outdoor activities between 10 AM and 4 PM, and avoiding artificial sources of ultraviolet light, such as indoor tanning.

In this study, pediatricians and the health care personnel (HCPs) working with them were interviewed about the timing and manner of their counseling and recommendations regarding sun protection and exercise. In addition, the parent accompanying a child to the visit with the pediatrician was surveyed about the parent's and child's performance of sun protection and regular planned exercise. Our hypothesis was that sun protection counseling by HCP would be associated with use of sun protection.

METHODS

The three Chicago area ambulatory practices, who are part of the Pediatric Practice Research Group, were identified with the assistance of the Community-Engaged Research Center of the Northwestern University Clinical and Translational Sciences Institute. Practices were selected based on at least one of the pediatricians having an interest in participating in skin cancer prevention research and on the location of the practice. This study was approved by the Northwestern University Institutional Review Board, and all participants provided written informed consent prior to participation. Participants did not receive compensation.

At each site, pediatricians and other HCPs were approached and asked to participate in a structured interview regarding prevention of obesity and sunburns lasting approximately 15 minutes. The structured interviews included 21 questions addressing participant demographics, including whether the participant was a pediatrician, nurse practitioner, nurse, or nursing assistant, and sex of the HCP; counseling methods (verbal, distribution of brochures) and recommendations regarding sun protection and regular exercise (Table I). Educational materials distributed by each practice were reviewed for sun protection and regular exercise recommendations. Participants were assured that their responses were anonymous and they would not be shared with others in the practice. Participants were asked to respond to the questions honestly.

From June to August 2010, the research assistant (RA) visited each practice site to accrue a convenience sample of at least 100 parents with a child between the ages of 9 and 16 years old. The RA administered a 46-item survey to the parent about their sun protection behavior, history of sunburning, and their child's sun protection and sunburning. In addition, the parent's habits of engaging in regular planned exercise, especially with reference to outdoor activities between 10 AM and 4 PM, as well as the child's engagement in outdoor sports

activities between 10 AM and 4 PM, were reviewed. The measures were previously used by our research team and others. (13–15)

For the parent and the child, daily sun exposure on summer weekdays and weekends was reported from the response options of 30 minutes or less, 31 minutes to 1 hour, 2, 3, 4, 5, or 6 hours (coefficient alpha = .79). Frequency of deliberate tanning in the sun was reported with a five-point Likert-type scale (coefficient alpha = .87). History of ever using indoor tanning had a dichotomous response, and frequency of indoor tanning in the last 12 months was provided numerically. Four sun protection behaviors (wearing sunscreen with an SPF greater than 15, wearing a shirt with sleeves, wearing a hat with a brim, and seeking shade) were reported with a five-point Likert-type scale (coefficient alpha = .88). Intentions to perform sun protection were assessed with five questions with five-point Likert-type scale responses (coefficient alpha = .92). The following two questions assessed sun protection self-efficacy with a five-point Likert-type scale: confidence that you know the best sunscreen, and you will be able to limit your outdoor activities, including exercise, to before 10 AM and after 4 PM (coefficient alpha = .93).

The child's skin type was classified by the color of untanned skin with response options of very fair, fair, golden/olive, light brown, dark brown, and very dark; and sun sensitivity with a five-point Likert-type scale (coefficient alpha = .83). Lastly, parental awareness of risk of developing skin cancer and concern about developing skin cancer were assessed with a five-point Likert-type scale (coefficient alpha = .81).

For adults, regular exercise was assessed as planned physical activity such as brisk walking, jogging, bicycling, swimming, dancing, tennis, rowing, or lifting weights that makes you breathe much harder than normal and is done 3 or more times a week for 20 minutes or more a session, or moderate activity that makes you breathe a bit harder than normal and is done 5 or more days a week for 30 minutes or more a day. Dichotomous responses were provided to the questions about engaging in regular exercise and outdoor exercise. If exercise was outdoors, adults provided the time of day that they were outdoors. For children, dichotomous responses were provided to questions concerning the child's participation in regular physical activity and organized sports. In addition, a dichotomous response was obtained to the question of whether the physical activity and/or organized sports occurred outdoors between 10 AM and 4 PM.

Demographic characteristics obtained were age, sex, annual household income, area of residence (a rural area, small town, suburb, or urban area) and ethnicity.

Statistical Analyses

Statistical analysis was done using Fisher exact test. Comparisons of rates of counseling across the different types of counseling and the practices were made using McNemar test.

The primary aim of this study was to correlate the sun protection and the regular exercise behavior of children ages 9–16 with the counseling provided in three ambulatory pediatric practices. Secondary outcome measures were association of parental behavior with the behavior of the child, parental perception of skin cancer risk with sun protection behavior of the child and parental sun protection self-efficacy with sun protection behavior of the child. Based upon prior experience with the survey items (13–15), it was estimated that a total sample of 300 children between the ages of 9 and 16 years old would provide a margin of error on a 95% confidence interval of 4.2% (based on a prevalence of 50%). Chi-square tests were used to compare practices on discrete variables, and *t*-tests were used for continuous variables.

The sun protection score represented the number of hours of sun exposure per weekday and weekend day, the frequency of time spent in the sun to get a tan, and the frequency of use of sunscreen with an SPF greater than 15, wearing a shirt with sleeves, wearing a hat with a brim, and staying in the shade. The scores ranged from 1 to 39 with low scores representing the greatest protection. Logistic regression analysis controlling for the child's age, sex, and skin tone assessed the effect of counseling with the child's sun protection scores, sunburns, and indoor tanning.

Parental skin cancer risk perception represented awareness of a personal risk of skin cancer and concern about developing a skin cancer. The scores ranged from 1–10 with those having low scores having the least perception of risk. Parental self-efficacy represented confidence in knowing the best sunscreen to use for the child and ability to limit outdoor activities of the child between 10 AM and 4 PM. The scores ranged from 1–10 with those having the low scores having the least self-efficacy.

Two groups of children, protected from sun and not protected, were defined by the child sustaining at least one sunburn and using indoor tanning. Comparisons of means for continuous variables were done through the Mann–Whitney test, whereas categorical variables were compared using chi-square test. To identify factors associated with sun protected or not sun protected, comparisons between groups were conducted by univariate and multivariate logistic regression procedure. The model included age, sex, and skin tone of the child, the child's participation in outdoor sports, the child's sun protection score, indoor tanning and sunburns. For the parent, the model included ethnicity, skin tone, annual household income and residence in an urban or rural area, regular parental engagement in outdoor exercise, parental perception of skin cancer risk, history of parental skin cancer, sun protection self-efficacy scores, sun protection score, indoor tanning and sunburns.

RESULTS

Thirty pediatric office staff personnel, 90% of the staff at the 3 practice sites, volunteered to participate in the study in June 2010. Of the 30 participants, 24 were interviewed from two suburban practice locations and 6 from an urban location. The study population included 7 pediatricians and 23 nurses/nurse practitioners/nursing assistants for a total of 30 respondents. There were 4 male and 26 female participants.

Among eligible parents of children ages 9–16, 87% participated in the survey. Mothers comprised 93% of respondents and 7% were fathers. Among the three locations, there was no significant difference in the ratio of mothers to fathers. The distribution of the sex and ages of the children were similar across the three offices (Table II). Office 3 was an urban location and the ethnic composition of the population differed from the suburban locations.

Counseling regarding sun protection

Verbal advice to use sunscreen was accompanied with a brochure given to 25% of the parents. Sunblock was recommended by 83% (19/23) of HCPs with recommendations tailored to the child's vacation plans (13%, 3/23). When at least 80% of the staff in a practice reported counseling, the office was considered as providing counseling, thus, the staff of office 1 provided the most detailed and frequent counseling (Table II). Sun protection counseling was associated with parental prompting ($p=0.004$), performing a summer camp physical ($p=0.002$), and the child having a sunburn ($p=0.003$). After controlling for the child's age, sex, and skin tone, intensity (number of items) and frequency of counseling (number of visits during which counseling was provided) was not associated with greater sun protection by the child (Table III). In multivariate analysis of the child's sun protection, the following variables maintained statistical significance: parental sunburns

during the summer of the study, parental use of indoor tanning in the last 12 months, parental perception of skin cancer risk and parental sun protection self-efficacy ($p=.02$; Table IV).

Counseling regarding regular exercise

Forty-seven percent of office staff participants (14/30) counseled parents about regular exercise for the child. Pediatricians were significantly more likely than other HCPs to counsel regarding exercise (7/7 or 100% vs. 7/23 or 30%, $p=0.002$). Specific recommendations were to engage in outdoor activities (46%, 14/30), enjoyable physical activity (29%, 4/14), and activities that increase the child's heart rate (29%, 4/14). In multivariate analysis of the child's regular outdoor exercise, the following variables maintained statistical significance: suburban location, annual household income $> \$76,000$, and parental participation in regular outdoor exercise ($p=.02$). Sun protection counseling occurred more frequently than exercise counseling in all practices ($p=0.014$).

Sun protection and children's outdoor exercise

Children who pursued outdoor sports or other forms of outdoor exercise between 10 AM and 4 PM were twice as likely to use inadequate sun protection and sustain sunburns than those who performed exercise indoors or outdoors before 10 AM or after 4 PM. (CI 1.3–1.7)

Conflicting recommendations

The co-occurrence of sun protection and regular exercise counseling by distribution of separate brochures about safety in the sun and regular exercise led to conflicting recommendations. Children were encouraged to participate in outdoor sports during the day without discussion of limiting outdoor activities between 10 AM to 4 PM or seeking shade during this period of sun avoidance.

DISCUSSION

Physician counseling by informing children and their parent to use sun protection was not associated with enhanced sun protection by the child. A range of counseling existed among the practices with significant limitations of sun protection counseling among over one-half of those interviewed (eg, counseling was only provided in spring and summer), when the child was sunburned or going on vacation or to summer camp, or when prompted by parental questions. Although it is understandable that sun protection counseling occurred only during the seasons with intense ambient ultraviolet light, pediatricians who counseled when cued by a sunburned child failed to provide anticipatory guidance. In Massachusetts, which has a climate with seasonal changes in ambient light similar to Chicago, about 70% of pediatricians ($n=756$) self-reported recommending safe sun practices only during the summer months. (16)

Even though counseling methods and recommendations regarding sun protection varied among the practices, children were verbally encouraged to wear sunscreen. Brochures encouraged children to participate in outdoor sports during the day without discussion of limiting outdoor activities between 10 a.m. to 4 p.m. or seeking shade during this period of sun avoidance. Thus, counseling recommendations for sun protection and exercise need to be integrated into one brochure and one verbal recommendation. When possible, sun exposure should be avoided between 10 AM and 4 PM. In the event of outdoor exercise within these hours, sun protection appropriate for the activity may include wearing protective clothing (hats, sunglasses, sleeves) that does not interfere with the sport as well as sunscreen with a broad spectrum sun protection factor greater than 15.

More sunburns were experienced and there was less use of sun protection by children in this study engaged in outdoor exercise, which emphasizes the need for consistent counseling about use of sun protection when engaged in outdoor exercise. In our study, the children's outdoor exercise between 10 a.m. and 4 p.m. exceeded that of their parents. Similarly, a 2005 US population-based study found that individuals who met or exceeded the minimum physical activity guidelines (17) reported more unprotected sun exposure and sunburns than their inactive counterparts. (18) The same population-based study determined that Midwest adults, such as those in our study, had greater skin cancer risk behaviors than adults from other regions.

In this study, the child's sun protection behavior was influenced by parental sun protection behavior, perception of skin cancer risk and sun protection self-efficacy. Others have shown that sunscreen use in parents correlates with sunscreen use in teens. (11) Children of parents who are vigilant about modeling sun safe behaviors are likely to adopt sun safe practices when assuming responsibility for their own skin protection. (19, 20) For this reason, sun protection for children needs to be aimed at parents as well as children. (21)

Pediatricians may engage parents in the process of adopting sun protection by increasing parents' awareness of their risk of developing skin cancer and confidence in their ability to perform sun protection. Communication with parents in a way that incorporates the principles of motivational interviewing, a patient-centered technique that attempts to engage patients in order to find reasons to change behavior that resonate with each individual, may be more effective in promoting behavioral change than admonitions to use sunscreen. (22, 23) Although this form of physician-patient communication seemingly would take more time, in our experience the conversation takes about 3 minutes to address the following components: (1) assess ultraviolet risk; (2) assess sunscreen use; (3) explore barriers to using sunscreen; (4) facilitate resolution to barriers to sunscreen use; (5) assess additional use of sun protection; and (6) summarize patients' motivations and ideas for improved sunscreen use. (21) Motivating behavioral change is a core competency for clinicians and may be used to prevent skin cancer, which as evidenced by the USPHS Task Force recommendation, has become increasingly important. (12)

There are various limitations to our study. The small sample size taken from three pediatrician offices in the same geographic area may have provided a biased population sample. Two offices provide care for a similar demographic of patients with a high proportion of non-Hispanic White patients, and this may have contributed to the high counseling rates regarding sun protection. One pediatrician in each group practice had an interest in sun protection, which may have led to increased rates of counseling among sampled practices. Additionally, self-report of counseling without validation by observing the counseling or exit interviews of parents may have introduced recall bias. The variety of sun protection and exercise counseling reported by the anonymous respondents suggested that practice habits were reliably elicited. The predominantly White population of patients studied and having a pediatrician interested in sun protection may limit the generalizability to other practices. Future studies must be done with more diverse populations in order to determine whether counseling methods using motivational interviewing principals will be effective.

Pediatricians, a trusted source of health information for the family, can counsel parents and children about the dangers of excessive sun exposure. "Best practices" in anticipatory guidance may promote daily sun protection during outdoor activities that would prevent painful sunburns and reduce the risk of developing skin cancer.

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Statistical analysis was performed by Alfred W. Rademaker, PhD (Department of Preventive Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois).

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Table 1**Sun Protection and Physical Activity Counseling by Pediatricians and their Office Staff**

Variable	Office 1	Office 2	Office 3
SUN PROTECTION			
Visit Type			
Well Care	x	-	-
School physical	x	-	-
Summer camp physical	x	x	x
Acute Care	-	-	-
Child sunburned	x	x	x
Time of Year			
All year	x	-	-
Spring/summer	x	x	-
Family vacation to sunny location	x	x	x
Recommendation			
Sun block	x	x	x
Reapply sun block	x	x	-
Protective clothing	x	-	-
Seek shade	x	-	-
Avoid sun 10 AM to 4 PM	-	-	-
PHYSICAL ACTIVITY			
Visit type			
Well care	x	-	-
School physical	x	x	-
Camp physical	-	-	-
Acute care	-	-	-
Child obese	x	x	x
Child high cholesterol	x	x	-
Time of Year			
All year	x	-	-
Spring/summer	x	x	-
Recommendation			
Regular exercise	x	x	
Outdoor activities	x	x	
Enjoyable physical activity			x
Activities increasing heart rate		x	
Sum of variables (n=25) (%)	19 (76)	13 (52)	6 (24)*

* chi- square, p<0.05, counseling varied among practices

Table 2

Demographic Characteristics of Child

Variable	Office 1 n=101 (%)	Office 2 n=100 (%)	Office 3 n=100 (%)
Sex			
Female	53 (52)	49 (49)	54 (54)
Male	48 (48)	51 (51)	46 (46)
Age (years)			
9–10	25 (25)	23 (23)	24 (24)
11–12	24 (24)	26 (26)	27 (27)
13–14	23 (23)	25 (25)	22 (22)
15–16	29 (29)	26 (26)	27 (27)
Skin color			
Very fair	11 (11)	10 (10)	16 (16)
Fair	51 (51)	56 (56)	27 (27) *
Golden/olive	19 (19)	26 (26)	22 (22)
Light brown	13 (13)	8 (8)	21 (21) *
Dark brown	7 (7)	-	14 (14) *
Very dark	-	-	
Ethnicity			
White	67 (67)	76 (76)	55 (55)
Hispanic	5 (5)	4 (4)	21 (21) *
Black	7 (7)	8 (8)	24 (24) *
Asian	21 (21)	12 (12)	- *
Residence			
Suburban	101	100	-
Urban	-	-	100 *
Annual Household Income (US dollars)			
20–34,999	-		2 (2)
35–50,999	-	8 (8)	24 (24) *
51–75,999	12 (12)	10 (10)	38 (38) *
76–100,999	16 (16)	17 (17)	23 (23)
101–150,999	22 (22)	23 (23)	12 (12) *
160–200,000	25 (25)	30 (30)	1 (1) *
Over \$200,000	26 (26) *	12 (12)	-

* chi-square, p<0.05

Table 3

Parent-Child Sun Protection, Sunburns, and Regular Outdoor Exercise

Variable	Office 1	Office 2	Office 3
Sun Protection [^] (1–39) (mean score± SD)			
Parent	12 (2.3)	19 (1.3)	15 (5.8)
Child	10 (4.1)	18 (1.4)	12 (3.7)
Sunburns in a summer (0–5 or more) (mean ± SD)			
Parent	1.8 (1.0)	1.1 (0.3)	0.6 (0.4)
Child	1.6 (1.2)	1.0 (0.9)	0.7 (0.3)
Regular Exercise [*]			
Parent (number yes) (%)	55 (55)	46 (46)	18 (18)
Outdoor (number yes) (%)	40 (40)	30 (30)	18 (18)
Between 10 AM–4 PM (number yes) (%)	40 (40)	30 (30)	18 (18)
Child (number yes) (%)	68 (68)	72 (72)	35 (35)
Outdoor (number yes) (%)	68 (68)	72 (72)	33 (33)
Between 10 AM–4 PM (number yes) (%)	68 (68)	72 (72)	33 (33)

[^] After controlling for the child's age, sex, and skin tone, there was no association between counseling and sun protection of the child.

^{*} After controlling for location of residence and annual household income, there was no association between counseling and regular outdoor exercise of the child.

Table 4

Multivariate analysis of association of sun protection of children with parental perception of skin cancer risk, parental sun protection self-efficacy, and outdoor exercise of the child

Variable	Child Not Sun Protected (n=120)	Child Sun Protected (n=181)
Number of Sunburns this summer (0–5 or more) (mean ± SD)		
Parent	1.8 (1.0)	0.6 (0.3) *
Child	2.6 (1.2)	0 (0) *
Indoor Tanning		
Parental use (number yes) (%)	64 (53)	85 (47)
Number of sessions in last 12 mo (mean ± SD)	8.2 (0.1)	0.4 (0.2) *
Child use (number yes) (%)	13 (11)	0 *
Number of sessions in last 12 mo (mean ± SD)	24 (4.2)	0 *
Sun Protection (1–39) (mean score± SD)		
Parent	8 (3.6)	25 (2.3) *
Child	9 (5.6)	18 (1.4) *
Parental Skin Cancer Risk Perception (1–10) (mean score ± SD)	4 (2.1)	8 (1.4) *
Parental History of Skin Cancer (number yes) (%)	0 (0)	4 (2.2)
Parental Sun Protection Self-efficacy (1–10) (mean score ± SD)	4.6 (2.3)	7.3 (1.4) *
Child Outdoor Exercise 10AM to 4PM (number yes) (%)	114 (95)	59 (32) *

*p=0.02