

Effects of a Sun Protection Program Targeting Elementary School Children and Their Parents

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Abstract

Background: Excessive sun exposure in childhood is considered a risk factor for later development of skin cancer, so sun awareness programs targeting children have been developed.

Objective: To assess the benefits of involving parents at home in the sun protection program received by their children at school.

Method: The existing "Sun and the Skin" program was enhanced in two ways. Parents were educated both about their child's program and with supplemental information. Also, sunscreen was distributed to each child.

Results: Certain methods of sun protection, particularly the use of sunscreen, are being practiced by the majority of children, while others, such as protective clothing, have not been readily adopted. The enhanced group of students showed improvement over control and standard groups in their attitude toward tanning. There is a need for teachers to remind their students to practice protective measures.

Conclusions: While a sun-awareness curriculum has been shown to be beneficial for elementary school children, the adjunct of parental and school involvement in this process can improve the results and ultimately decrease the risk of skin cancer in the children.

Sommaire

Antécédents: L'exposition excessive au soleil durant l'enfance étant considérée comme un facteur de risque de cancer de la peau, des programmes de sensibilisation aux effets du soleil ont été élaborés à l'intention des enfants.

Objectif: Évaluer les avantages d'une participation des parents à un programme de protection contre les rayons solaires offert aux enfants à l'école.

Méthodes: Le Sun and Skin Program actuel a été renforcé de deux manières: le programme a été présenté aux parents qui ont également reçu des renseignements supplémentaires, et des crèmes solaires ont été distribuées à chacun des enfants.

Résultats: Certains moyens de protection contre le soleil, en particulier l'utilisation d'un écran solaire, sont utilisés par la majorité des enfants, mais d'autres moyens, tels que le port de vêtements destinées à les protéger du soleil, sont difficilement acceptés. Les comportements à l'égard du bronzage chez les élèves du groupe ayant suivi le programme renforcé se sont améliorés par rapport à ceux du groupe témoin et du groupe normal. Il faut que les enseignants rappellent aux élèves qu'ils doivent se protéger du soleil.

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Conclusion: Il a été démontré qu'un programme de sensibilisation aux effets du soleil peut être bénéfique chez les enfants du primaire, et que la collaboration des parents et de l'école permet d'améliorer les résultats et finalement de diminuer le risque de cancer de la peau chez les enfants.

Skin cancer is both the most common form of cancer and one of the most preventable.¹ Excessive sun exposure and sunburns, particularly in childhood,^{2,3} are strongly related to the development of skin cancer.^{4,5} To address this problem of childhood sun exposure, sun awareness programs targeting children have been developed.

Childhood is a critical time for sun exposure. Most sun exposure occurs within the first 20 years of life,⁶⁻⁸ with children receiving three times the annual sun exposure of adults.^{3,9} It has been estimated that the regular use of sunscreen with a Sun Protection Factor (SPF) of 15 or greater during the first 18 years of life could reduce the lifetime incidence of nonmelanoma skin cancer by 78%.⁹ Healthy behaviors and habits, such as sun protection, adopted in childhood are more likely to be applied in adulthood.^{4,10}

Education in sun awareness and sunscreens is an important part of skin cancer prevention. Early interventions aimed at children should have a significant impact on the incidence of skin cancer.^{10,11} Recognizing the importance of promoting sun protection behaviors in childhood, programs involving children and/or parents and other caregivers have been developed. Most sun awareness education campaigns have educated parents and caregivers alone, a few have educated only children, and even fewer have involved both.¹² Educational efforts aimed at children have included games, skits, fact sheets, pamphlets, videos, workbooks, and peer teaching.¹²

The "Sun and the Skin" program, developed at the University of Western Ontario (UWO), has been shown to improve the knowledge and behavior of Grade 4 students in London, Ontario, Canada.¹³ The present study builds on the previous study. It not only provides a longer followup, but it also assesses the impact of an enhanced program that includes parental involvement and distribution of sunscreen on students' attitudes, behaviors, and incidence of sunburns.

Methods

Twenty-three Grade 4 classes in London, Ontario, Canada, were divided into three groups designated as "enhanced", "standard", and "control". The groups were chosen based on a first-come-first-served basis determined by the teachers' response to an e-mail sent out to all public schools in the Thames Valley District School Board. The first 16 schools to respond were randomized with 8 in the enhanced group and 8 in the standard group. The next eight classes that responded after the quota had been met were placed into the control group.

Both the standard and the enhanced groups and their teachers received the Sun and the Skin presentations in May 1999. Medical students presented a one-hour interactive slide presentation that included discussion of ultraviolet (UV) light, the harmful effects of the sun, and skin cancer risks and prevention. Most importantly, sun protection strategies including sunscreen, clothing, hats, sunglasses, avoiding midday sun, and seeking shade were emphasized. Additional materials were provided to the students before and during the presentations as described in the initial study.¹³

The enhanced group differed from the standard group in two respects. First, in the enhanced group, each student was sent home with a letter informing the parents about the presentations their child had received and informed them about the importance and relevance of sun protection behaviors. The letter also encouraged parents to ensure that their child had appropriate sun protection paraphernalia; a sun protection fact sheet also was included. Second, children in the enhanced groups received sunscreen in June 1999, prior to the start of summer vacation. The control group received neither the Sun and the Skin presentations nor any of the enhancements. However, the children in the control group did receive Rayguard activity books (as did standard and enhanced groups), which provided some education on sun awareness and protection.

All three groups were surveyed in a pretest and posttest format. Both parents and children were surveyed in May before the presentations, and again in June after the presentations. Finally, modified surveys were used in September to assess behavior and sun damage outcomes during the preceding summer. Each child was given a personal code number that also identified the group they belonged to so as to maintain anonymity. Teachers were surveyed about the knowledge, attitudes, and behaviors of their students only in May and June because they would not have observed the children's activities and behaviors over the summer.

Results

Twenty-three classes in 16 schools participated in this research study. There were eight classrooms in the enhanced and standard groups, and seven classrooms in the control group. The number of responses at each survey period is indicated in Table I. In the initial May survey, 509 children and 430 parents participated. In June, only 366 children and 152 parents responded. In addition, fewer responded in September: 259 children and 232 parents.

TABLE I

Group	Number of responses at each survey period							
	May			June			September	
	Teacher	Parent	Child	Teacher	Parent	Child	Parent	Child
Control	5	130	148	4	81	151	103	97
Standard	7	163	191	4	48	107	72	107
Enhanced	7	137	170	4	23	108	57	55

Teachers

The response rate for the teachers' surveys fell from (5/7) 71% in the control group in May to 57% (4/7) in June, and from 88% (7/8) in May in the standard and enhanced groups to 50% (4/8) in June. In May, all teachers but one in the standard group characterized their students as "somewhat" aware of the consequences of excessive sun exposure. In June, 75% (3/4) of the control group, 100% (4/4) of the standard group, and 50% (2/4) of the enhanced group characterized their students as being very aware of the consequences of too much sun.

Teachers were asked to estimate the percentage of their class that practiced various sun protection behaviors. Most teachers listed 0%–24% of students as wearing long pants and long-sleeved shirts in the warm weather. All teachers but one indicated that less than 50% of their class usually wore a hat outdoors; the hats worn were all baseball caps rather than wide-brimmed hats. In most classrooms, teachers observed that less than 25% of students wore sunglasses outdoors, and less than 25% of students applied sunscreen at least once during the day. These reported behaviors were similar in May and June, and there were no significant differences between the groups. In May and June, all teachers but two indicated that 0%–25% of their students had a sunburn during the year; the other two teachers responded that 25%–50% of their students had a sunburn during the year.

Teachers were also asked to characterize the attitudes of their students. There were no teachers in either time period who believed their students thought that tans were "cool" and that they would want to have a tan.

Parents

Both the enhanced and the standard groups showed an improvement in the number of children without any sunburns between the May and September surveys (Fig. 1). There was a nonstatistically significant trend toward the absence of sunburns. In the enhanced group, 40.2% of the children did not have a sunburn in the May survey; this improved to 50.9% in September. The standard group also improved, from 43.6% to 54.2%, while the control group showed little change, from 43.1% to 42.7%. There was no significant difference in September in the number of multiple sunburns (≥ 2) among the three groups, with the control group at 10.7% of children with multiple sun-

FIGURE 1 No sunburns: light gray bars = May; dark gray bars = September

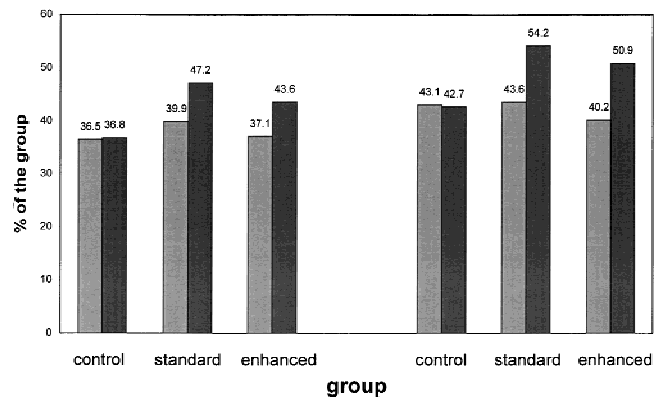
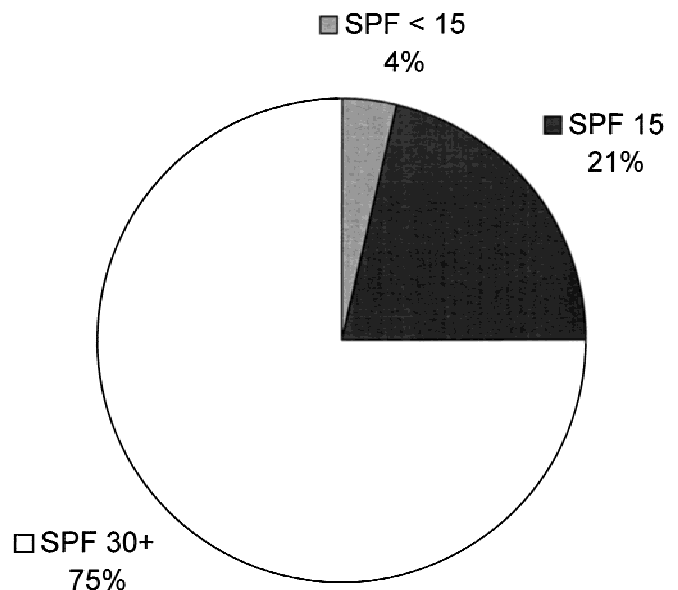


FIGURE 2 SPF of sunscreen used



burns and the standard and enhanced groups at 12.5% and 12.3%, respectively.

According to the May parent surveys, their children were already practicing many sun protection behaviors to a high degree. A large proportion of parents (75%–78.6%) reported that their children used an SPF ≥ 30 and 96% of parents reported that their children used an SPF ≥ 15 (Fig. 2). The percentages reported in Figure 3 are

TABLE II

Most popular ways to improve education and sun protection behavior of children as reported by parent surveys	
Parental suggestions	% of responses
Children reminded prior to recess and lunch	43%
More extensive education at school	27%
Education is sufficient as it is	21%
Media to emphasize importance	9%

from the enhanced group responses in September, and trends in the standard and enhanced groups were similar. Between 90% and 95% of parents reported that their children, “sometimes” to “usually” applied sunscreen 15–30 minutes before going out in the sun, reapplied sunscreen after swimming or sweating, and avoided activities during the midday sun. The use of long pants and long-sleeved shirts to protect the skin from the sun were not popular options among children. Most parents reported that their children either “never” or “sometimes” wore such clothing in the May surveys. There was no improvement in the September survey with no differences among the groups.

In the May and June surveys, parents who did not purchase sunscreen for their children were asked why they had not made the purchase. In the May survey, 30 parents from all three groups chose the following reasons: they were too busy to purchase sunscreen (15), they did not believe in the use of sunscreen (8), they could not afford sunscreen (6), and the child was allergic to sunscreen (1). No parent chose “my child refuses to wear sunscreen”. The June surveys showed similar results.

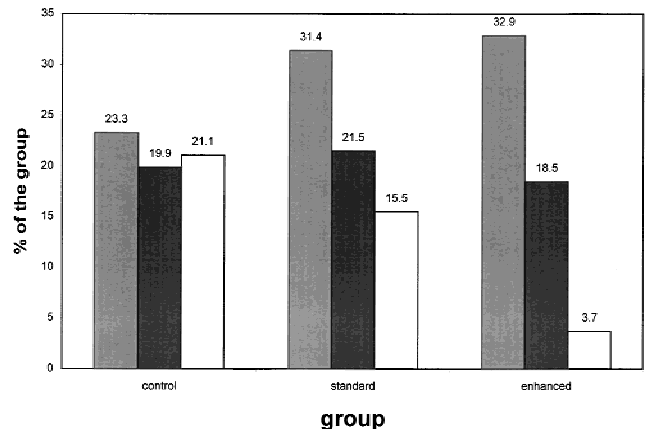
The September survey asked the parents for the best way to improve the education and sun protection behavior of their children (Table II). The most common answer (43%) chosen was that prior to recess or lunch, children should be reminded to put on their sunscreen, sunglasses, and hats. No differences in frequency of this answer were found among the three groups.

Children

The results of the children’s surveys with respect to sunburn mirrored those found in the parents’ surveys. The percentage of children reporting “no sunburns” was constant in the control group between the May and September surveys, while it increased in both the standard and the enhanced groups (Fig. 1). In all three survey periods, a large proportion of children reported using sunscreen with SPF ≥ 30 , and more than 90% of children used sunscreen with SPF ≥ 15 . No differences were observed among the groups or time periods.

Children were also asked about their attitudes about tanning or having a tan (Fig. 3). The enhanced group showed a significant reduction ($p < 0.05$) in the percentage of students who wanted a tan from the May (32.9%) sur-

FIGURE 3 Children who want a tan: light gray bars = May; dark gray bars = June; white bars = September



vey to the September (3.7%) survey. The standard group exhibited a smaller reduction, from May (31.4%) to September (15.5%), whereas the control group showed no improvement in their attitude toward tanning from May (23.3%) to September (21.1%).

The September survey also asked children three new questions. First they were asked who taught them the most about sun awareness and protection. In the control group, 62.5% of children chose their parents. In the enhanced and standard groups, the majority of answers (90%) were divided evenly between parents and “people who came into our school to teach us” ($p = 0.001$). Second, children were asked why some of them did not practice sun protective behaviors. There were no significant differences among the groups. Cumulatively, 48.4% responded that they forgot to practice sun protection; 29.1% always practice sun protection; 20.5% find sun protection behaviors too much of a hassle; 1.2% reported that their parents had not purchased sun protective paraphernalia for them; <1% believed that sun protection was not important. Third, students were asked whether they would like to be reminded by their teachers, prior to lunch or recess, to apply sunscreen; 45.6% responded in the affirmative.

Discussion

The scope of this survey can be used to evaluate the sun protection practices of children today. The results indicate that many aspects of sun protection are being practiced consistently, while others, such as the use of protective clothing, are not. The surveys assessed the effectiveness of our intervention—the “Sun and the Skin” program—and whether the involvement of parents and the distribution of sunscreen added benefit.

There may be some bias in the June and September surveys in that there was a noticeably lower response rate than there was in May. This bias may be attributed to a difference in the method of survey distribution and the

timing and deadlines of the collection. Since the children were no longer all in the same classroom in September, the surveys were distributed from the school office instead of the classroom. Also, children were asked to bring home both the parent and child surveys for completion. Any child who moved or transferred was lost to followup. Also, some parents refused to complete the survey. The May survey asked some questions that required the recall of behavior and incidence of sunburns from the previous summer, whereas the September survey asked the same questions right after summer. Since the control group's answers for parents and children did not appear to vary, the recall may have been fairly accurate. Despite the reduced response rate and its effect on validity, there remain several useful findings. The survey not only gives us a good appreciation of current protective habits among Canadian children, but it also highlights the need for teacher involvement in the form of classroom reminders. The improvement in attitude toward sun tanning was the strongest quantitative finding of this study.

We found no surveys that included teachers, parents, and children simultaneously before and after an educational program, such as the "Sun and the Skin" program.¹² The results from this survey indicate a high level of correlation between teachers, children, and parents, which reinforces the validity of the results. Parents, teachers, and children consistently responded that long-sleeved clothing and wide-brimmed hats were not used as a form of sun protection.

Teachers and children both agreed that most children were not interested in sun tanning. Although a tanned appearance is currently popular among young adults, only about a third of the Grade 4 children surveyed in May wanted a tan. This proportion was diminished further, most noticeably in the enhanced group in September. These findings are more encouraging than a study showing that 54.6% of medical students felt that a tanned appearance was healthy, which dropped to 37% after a sun awareness curriculum.¹⁴ Attitudinal changes are important in that they contribute to subsequent changes in behavior.^{15,16}

There was a trend toward no sunburns, especially in the enhanced group. Questions regarding the SPF used, the reapplication of sunscreen, and the timing of outdoor activities were answered similarly in both parent and child surveys, suggesting that the Grade 4 students had a good understanding of their sun protection behavior.

The number of sunburns incurred is often used as an indicator of sun exposure and protection.⁵ In the September survey, parents and children in the enhanced and standard groups were more likely to report the absence of sunburn in their children (Fig. 1) than they reported in May and June. It is encouraging that a large proportion of parents reported the use of sunscreen with SPF ≥ 15 , the application of sunscreen by their children 15–30 minutes prior to going outside, that reapplication of sunscreen

after swimming or sweating, and a decrease of midday activities in the sun.

Several areas in which sun protection could be improved were identified. Similar to the findings in the parents' surveys, most children reported they rarely used long pants and long-sleeved shirts as protective measures from the sun. This difficulty in increasing the use of clothing as a protective measure has been found in several studies.^{4,17–19} In addition, there is always room for improvement in the proper application of sunscreen, the use of sun protection accessories, and maximizing avoidance of the sun. Finally, a sun awareness and protection curriculum has been shown to affect the attitudes of medical students toward suntanning, which emphasizes the need to target younger age groups with this message.¹⁴ In order to reduce the future development of skin cancers, the ultimate goal is to reduce the number of sunburns and the percentage of blistering sunburns.

In the interest of improving this program and the sun awareness message, parents who did not purchase sunscreen for their children were questioned as to their reasoning. Their responses indicate that a program similar to our enhanced program in which sunscreen was provided to the children would serve well to deal with some of the difficulties, namely, the inability to afford sunscreen and to find the time to purchase it. Another common reason cited for not purchasing sunscreen was that some parents did not believe in its efficacy. The free distribution of sunscreen and the education of parents with, for example, the information distributed to the enhanced groups, could help to change some of these beliefs.

The reasons why children did not practice sun protection behavior highlight the importance of reminding children to apply protective measures. An Australian study has shown that sun exposure during school breaks and outdoor sport activities can be quite substantial.²⁰ While parents have an important role in promoting healthy behavior in their children, since a large proportion of the time spent outside is during school hours, teachers can have an important influence on the protective practices of young children. In our study, approximately half of the parents (43%) and children (46%) would like a sun protection reminder during school hours. Other studies have shown that school-based interventions and policy changes targeting children can be successful in reducing ultraviolet radiation exposure.^{7,21} These results support the notion that schools and teachers should strongly consider an active sun protection program. While it would be beneficial for teachers to impart some of the sun awareness message, because of time and other constraints, programs such as the Sun and the Skin would be helpful, particularly if followed by teacher reminders to classes prior to lunch or recess.

This intervention was targeted at children, teachers, and parents. It is logical to teach sun protection behavior early because behavior learned early in childhood often becomes habit.¹⁰ Habits, good or bad, are difficult to

change or modify once formed. It is also important to involve parents, who play both a direct and an indirect role in the behavior of their children.¹⁰ Parents both provide and encourage the use of sun protective materials. Ultimately, our goal was to influence behavior and decrease the incidence of sunburns. Sun protection behavior is dependent on predisposition, social norm, physical environment, activity demands, and weather.¹⁰ Our enhancements improved the influence of social norms such as attitudes toward tanning.

Conclusion

Because of the marked increase in skin cancer incidence, an organized effort to educate the public about the dangers of ultraviolet radiation is needed. The large quantity of sun exposure in childhood, the linkage of childhood sun exposure to skin cancer, research supporting long-term use of sunscreen in the prevention of skin cancer,²² and the translation of childhood practices (e.g. brushing one's teeth) into adulthood emphasize the need for sun awareness interventions targeting children.

This study demonstrates that a comprehensive program of parental involvement, teacher awareness, and provision of sunscreen in a sun awareness curriculum targeting children can improve the sun protection attitudes and behavior of young children. This, in turn, might curtail the increasing rate of skin cancer.

The increasing awareness of the harmful effects of the sun and the increasing use of sun protection is encouraging. One of the best ways to improve sun protection is by the use of protective clothing, an underutilized form of protection. The continued use of sunscreen and an increased use of protective clothing should be part of a community-wide effort. Schools and teachers need to play a more active role in encouraging and reminding children to practice healthy sun protection measures. Programs such as that described in this article are essential for minimizing sun exposure in our children and the adults of tomorrow.

The Sun and the Skin program had a positive influence on sun protection attitudes and behavior among children. Parental involvement and the distribution of sunscreen further enhanced this influence. Further photoprotection would be achieved if school boards were encouraged to provide more shaded areas at recess, to time recess to avoid midday sun, and to encourage teachers and parents to remind children to apply sunscreen prior to going outdoors.

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