

# Preventing Skin Cancer: Education and Policy Approaches in Primary School Settings (2002 Archived Review)

---

## Table of Contents

Review Summary .....	2
Intervention Definition .....	2
Summary of Task Force Finding .....	2
About the Intervention .....	2
Results from the Systematic Reviews .....	2
Publications.....	3
Task Force Finding.....	4
Intervention Definition .....	4
Task Force Finding.....	4
Supporting Materials .....	5
Analytic Framework .....	5
Evidence Gaps .....	5
What are Evidence Gaps? .....	5
Identified Evidence Gaps.....	5
Summary Evidence Table .....	8
Included Studies.....	16
Disclaimer.....	18

## Review Summary

### Intervention Definition

Interventions in primary school settings are designed to increase sun-protective knowledge, attitudes, and intentions, and affect behavior among children from kindergarten through eighth grade. The interventions focus on some combination of increasing application of sunscreen, scheduling activities to avoid peak sun hours, increasing availability of shade and encouraging children to play in shady areas, and encouraging children to wear sun-protective clothing. It should be noted, however, that increased sunscreen use alone, while useful as part of a healthy sun-protective behavior regimen, is not considered to be sufficiently protective to justify a Task Force recommendation.

### Summary of Task Force Finding

The Community Preventive Services Task Force recommends educational and policy approaches in primary schools to improve children's "covering up" behavior based on sufficient evidence of effectiveness.

The Task Force finds insufficient evidence to determine the effectiveness of this intervention in:

- Improving other sun-protective behaviors (e.g., avoiding the sun) because of inconsistent findings
- Decreasing sunburns because only a single study, with limitations in design and execution, reported on this behavior

### About the Intervention

Interventions included at least one of the following:

- Providing children with instruction and/or brochures, flyers, newsletters, letters or videos
- Activities intended to change:
  - Children's behavior (e.g., modeling, demonstration, role playing)
  - Knowledge, attitudes, or behavior of teachers or parents
- Environmental or policy approaches (e.g., providing sunscreen or shade, scheduling outdoor activities to avoid peak sunlight)

### Results from the Systematic Reviews

Twenty studies qualified for the review.

- Among studies with concurrent comparison groups, findings include:
  - Avoiding the sun: median relative increase of 4% (interquartile range: -8% to 16%; 7 study arms)
  - Covering up: median relative increase of 25% (13 study arms)
  - Using sunscreen: median relative increase of 17% (interquartile interval: 2% to 32%; 6 study arms)
  - Composite behaviors: median relative increase of 2% (interquartile interval: -6% to 72%; 15 study arms)
- Among before-and-after studies, findings include:
  - Covering up: median relative increase of 70% (interquartile interval: 42% to 100%; 5 study arms)
  - Using sunscreen: median relative increase of 34% (interquartile interval not available; 2 study arms)
  - Avoiding the sun: relative increase of 16% (interquartile interval not available; 1 study arm)
- Other results

- The overwhelming majority of intervention arms showed a significant increase in knowledge (22 out of 25 arms) and a significant change in attitude (13 out of 17 arms). Only four reports evaluated intentions and their findings were inconsistent in direction and generally not statistically significant.

These results are based on a systematic review of all available studies led by scientists from CDC's Division of Cancer Prevention and Control with input from a team of specialists in systematic review methods and experts in research, practice and policy related to preventing skin cancer.

## Publications

CDC. [Preventing skin cancer. Findings of the Task Force on Community Preventive Services on reducing exposure to ultraviolet light](#) [www.cdc.gov/mmwr/preview/mmwrhtml/rr5215a1.htm]. *MMWR* 2003;52(RR-15):1–12.

Saraiya M, Glanz K, Briss PA, et al. [Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: a systematic review](#) [www.thecommunityguide.org/cancer/skin/ca-skin-AJPM-evrev-reduce-exposure.pdf]. *Am J Prev Med* 2004;27(5):422-66.

Task Force on Community Preventive Services. [Recommendations to prevent skin cancer by reducing exposure to ultraviolet radiation](#) [www.thecommunityguide.org/cancer/skin/ca-skin-AJPM-recs-reduce-exposure.pdf]. *Am J Prev Med* 2004;27(5):467-70.

Task Force on Community Preventive Services. [Cancer](#) [www.thecommunityguide.org/cancer/Cancer.pdf]. In: Zaza S, Briss PA, Harris KW, eds. *The Guide to Community Preventive Services: What Works to Promote Health?* Atlanta (GA): Oxford University Press;2005:143-87 (Out of Print).

## Task Force Finding

### Intervention Definition

Children are in school during peak hours of UV radiation, and may often be outdoors for play or recess. They are more receptive than adolescents to practicing self-protective behaviors and are more amenable to instruction received from adults, including teachers and parents.

### Task Force Finding (February 2002)\*

On the basis of sufficient evidence of effectiveness, the Task Force recommends interventions in primary schools to improve covering-up behavior. Evidence was insufficient to determine effectiveness in improving other sun-protective behaviors (e.g., avoiding the sun) because of inconsistent findings. Evidence was also insufficient to determine effectiveness in decreasing sunburns because only a single study, with limitations in design and execution, reported on this behavior.

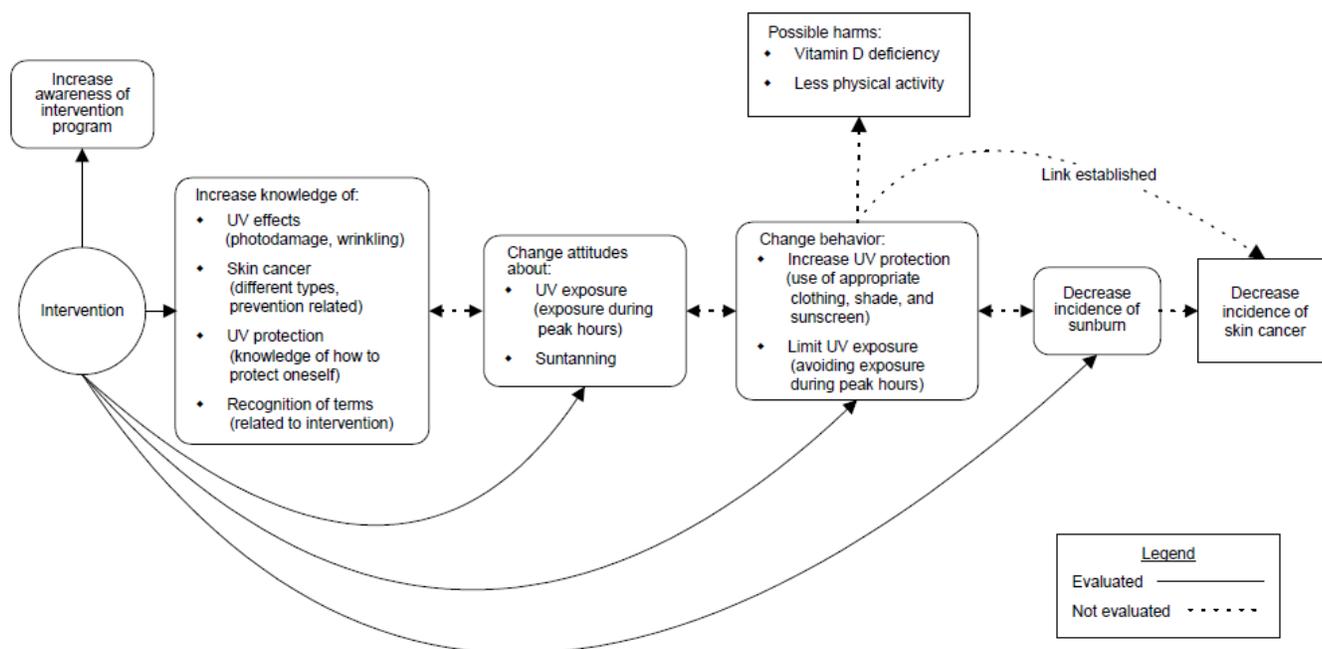
\*From the following publication:

Task Force on Community Preventive Services. [Recommendations to prevent skin cancer by reducing exposure to ultraviolet radiation](http://www.thecommunityguide.org/cancer/skin/ca-skin-AJPM-recs-reduce-exposure.pdf) [www.thecommunityguide.org/cancer/skin/ca-skin-AJPM-recs-reduce-exposure.pdf]. *Am J Prev Med* 2004;27(5):467-70.

## Supporting Materials

### Analytic Framework

#### A Conceptual Approach to Prevention of Skin Cancer through Interventions to Reduce UV Light



\*Improvements in sunscreen use alone would not result in a recommendation outcome (see full MMWR report)

### Evidence Gaps

#### What are Evidence Gaps?

Each Community Preventive Services Task Force (Task Force) review identifies critical evidence gaps—areas where information is lacking. Evidence gaps can exist whether or not a recommendation is made. In cases when the Task Force finds insufficient evidence to determine whether an intervention strategy works, evidence gaps encourage researchers and program evaluators to conduct more effectiveness studies. When the Task Force recommends an intervention, evidence gaps highlight missing information that would help users determine if the intervention could meet their particular needs. For example, evidence may be needed to determine where the intervention will work, with which populations, how much it will cost to implement, whether it will provide adequate return on investment, or how users should structure or deliver the intervention to ensure effectiveness. Finally, evidence may be missing for outcomes different from those on which the Task Force recommendation is based.

#### Identified Evidence Gaps

##### Design and Analysis Considerations

- All of the designs included in this review have important strengths and weaknesses.

- Additional diverse approaches are worth pursuing, in terms of study design and execution, and with attention both to internal and external validity.
- Consistently rigorous analytic methods are needed, and future studies should control for relevant confounders, such as risk levels and weather conditions.

### *Description of Target Population and Context*

- Several reports in this area of research did not contain basic descriptions of the intervention or population.
- In many instances, the distribution of the population by race and ethnicity or sun sensitivity was not described.
- Many of the settings could have been better described.
- Better descriptions are needed of annual UV exposure in the places in which studies were conducted.
- Better descriptions of these important issues would help assess the likely applicability of the findings or explain any variability of effects.

### *Description of Intervention*

- It was difficult to disentangle what specific intervention components were, or how much emphasis there was on primary prevention (versus early detection) or on promoting use of sunscreen versus on covering-up or sun-avoidance behaviors.
- Further information is needed on which attributes of the interventions contribute most to intervention effectiveness or ineffectiveness (e.g., do policy components or education components contribute more to intervention effectiveness; what are the central "active ingredients" in complex interventions).
- Describing intervention characteristics in greater detail might also help practitioners replicate successes.

### *Duration of Interventions and Length of Follow up*

- Given the seasonality of sun-protective behaviors and the importance of encouraging habitual as opposed to short-term behavior change, a longer follow-up is crucial.

### *Intervention Quality*

- An encouraging trend can be seen in increasing use of formative research and pre-testing of interventions before they are implemented.
- Mediating factors deserve greater attention and need to be correlated with behavior changes. To date, few studies in this area of research have reported on both mediating factors and behavioral or health outcomes.
- A need also exists to develop measures of the effects of environmental and policy change strategies. Few interventions addressed policy or environmental changes and in those that did, the effects of the policy or environmental components could not be disentangled from other aspects of the intervention.

### *Measurement of Exposure*

- Few studies reported process evaluation data, which can help to assess how much of the intervention was actually implemented.
- Improvement in this area would be helpful, especially for interventions of longer duration and increased complexity.

### *Measurement of Outcomes*

- More behavioral and health outcomes need to be examined.

- Given recent concerns about the adequacy of sunscreen as a sole protective strategy, additional behavioral and health outcomes should also be measured.
- Outcomes need to be similar to evaluate effectiveness.
- Measurement of specific sun-protective behaviors is important.
- More interventions with a greater focus on covering up and sun-avoidance, and a decreased emphasis on sunscreen use are needed.
- Given recent research findings on the effectiveness of sunscreens, more detailed research on sunscreen use is needed.
  - Are higher SPF sunscreens being used?
  - Does sunscreen use extend the amount of time out in the sun?
- How do different sun-protective behaviors interact (e.g., does seeking shade make wearing sunscreen or a hat unnecessary)?
- Further work is needed to increase consistency between at least a core set of behavior change measures that can be used to compare and contrast study results.

### *Research Needs and Work in Progress*

The field of behavior change for skin cancer prevention has progressed significantly, but important areas for further advancement exist. As outlined above, these include design, measurement, better description of interventions, development of a better understanding of how environmental and policy interventions work, and studies in multiethnic populations. The use of new communication technology and international collaborations can make significant contributions in these areas. The team hopes that the availability of systematic reviews that identify both progress to date and the remaining gaps will help to reduce the gaps in available research.

- **Specific Research Issues.** Although most of the evidence gaps described above were general and could explain why most setting specific categories did not produce sufficient evidence to determine effectiveness, a few research issues were specific to the setting or target group.
- **Interventions for Secondary Schools.** More studies are needed to examine sun-protective behaviors of adolescents and young adults, and to determine what kind of approach might work best in this population, especially given the low baseline prevalence of sun-protective behaviors.
- **Interventions in Occupational Settings.** Studies that target the most common outdoor occupational workers—mail carriers, agricultural workers, landscapers, horticulturists, foresters, construction workers, telephone line workers, commercial fishery workers, land surveyors and mappers, oil field workers, amusement park attendants, and athletes—are needed.
- **Interventions in Healthcare Settings.** Almost all studies in this category examined the counseling behavior of the provider and not the patient. More studies that examine the behavioral or health outcome of the end user—the patient—are needed. In this small subset of studies, the provider was most often a physician or a physician-in-training, but studies examining the role of the nonphysician provider would help identify whether counseling skills to change behavior might be better suited for providers with the time and skills, such as a nurse or a health educator. Additionally, more studies are needed to examine healthcare system studies oriented directly to patients.
- **Interventions for Parents and Caregivers.** Studies are needed to examine the effect of interventions on nonparental caregivers, as it is becoming increasingly common for children to be cared for by nonparental caregivers while both parents are at work outside the home.

- **Interventions in Multicomponent Community Settings.** Approaches to better define the "active ingredients" (i.e., the most important components that contribute to the success of these interventions) would be helpful, as would determining the applicability of these interventions to the U.S. population.

### Summary Evidence Table

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
Bastuji-Garin et al., 1999 France Before-and-after study Least suitable Good quality	F/U: 3 months from end of I n = 203 Limitations: Neither the content nor the intensity of the education were described in detail; no description of the sampling frame for the schools or eligibility criteria; volunteer sample of schools may have selected for staff with an interest in the subject and biased results away from the null; single interviewer not blinded; intervention may have changed self-reports rather than actual behavior; unrelated time trends may have contributed to apparent positive effects	Mean age: 9.2y % Female: 50.5% Race/Ethnicity: NR SES: Upper middle class	Interactive sun-awareness program consisting of individual journals prepared by the children, and a skit and poster, or interactive game to integrate material of each sun awareness topic; weekly packet provided a different topic each week for 4 weeks	<b>Child health outcomes and sun-protective behaviors</b> (single items) Children reporting that their skin never sunburns: Absolute change: +20.0 Relative change: +42.7% ( $p < 0.001$ , within) Children reporting that they always wear a hat Absolute change: +9.9 Relative change: +41.6% ( $p = 0.01$ , within) Children reporting that they always wear a t-shirt: Absolute change: +2.5 Relative change: +5.3% ( $p = 0.01$ , within) Children reporting that they avoid sunny hours Absolute change: +10.8 Relative change: +16.4% ( $p = 0.02$ , within) Children reporting that they always wear sunscreen: Absolute change: +9.4 Relative change: +37% ( $p = 0.03$ , within)

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
Buller et al., 1994 Arizona RCT Greatest suitability Good quality	F/U: Immediately following end of I n = 139 Limitations: Limited demographic information on study population; no description of schools; convenience sample of schools; self- reported outcome measures; group design but individual analyses may have resulted in overestimated effect	Mean age: NR (4th–6th graders) % Female: NR Race/Ethnicity: NR SES: NR	I: Classroom curriculum for 4th–6th graders, consisting of skin cancer and UV protection education, lesson plans, inclass activities, take- home activities, newsletter, and dissemination suggestions for involving entire school C: No intervention	Children wear protective clothing in summer (single item; range 1–3): Absolute change: 0.37 Relative change: +27.6% ( $p < 0.05$ , between) Children wear sunscreen in winter (single item; range 1–3): Absolute change: 0.18 Relative change: +13.55% ( $p < 0.05$ , between)
Buller et al., 1999 Arizona RCT Greatest suitability Good quality	F/U: 2 months from B/L n = 159 Limitations: No descriptions of schools; convenience sample of volunteer schools and classrooms; childrens' self- reported outcome measures; no comparison of groups at baseline	Mean age: NR (Range: 9–11y) % Female: 53.7% Race/Ethnicity: 57% White; 36% Other (mainly Hispanic); 7% NR SES: NR	I-1: CD-ROM sun safety game and interactive activities, modified for grades 4 and 5, with children earning points on each activity I-2: Sun safety curriculum only, sun safety game and activities I-3: Sun-safety curriculum + CD- ROM C: No intervention	<b>Child composite sun- protective behaviors</b> (mean score, 13 items, 3- point scale): I-1: Absolute change: +0.07 Relative change: 3.5% I-2: Absolute change: +0.14 Relative change: 7.3% I-3: Absolute change: +14 Relative change: 7.2% Overall $p = 0.074$

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Buller et al., 1996 Arizona RCT Greatest suitability Good quality</p>	<p>F/U: 2 months from B/L n = 447 Limitations: Low participation rates; childrens' reports of own and of parents' behavior; group design and individual analyses may have overestimated significance</p>	<p>Mean age: Range 8–10y % Female: 49% Race/Ethnicity: 63.7% White; 10.4% Hispanic; 2.8% African American; 15.6% Other; 7.4% NR SES: NR</p>	<p>I: Multidisciplinary curriculum on sun properties, composition of the skin, historic attitudes to tanning, and strategies to reduce sun exposure; included lesson materials, in-class and take-home activities, workbook, key term glossary, quick review, and newsletter C: No intervention</p>	<p>Children wear protective clothing in summer (mean score, 3-point-scale): Absolute change: +0.07 Relative change: +4.9% (<math>p=0.43</math>, between) Children lay in sun to tan (mean score, 3-point scale): Absolute change: -0.11 Relative change: +4.4% (<math>p=0.11</math>, between) Children play early or late when outside (mean score, 3-point scale) Absolute change: +0.12 Relative change: -6.3% (<math>p = 0.27</math>, between) Child composite sun- protective behavior (13 items, 3-point scale): Absolute change: +0.02 Relative change: +1.0% (<math>p=0.51</math>, between) Children wear sunscreen in summer (mean score, 2-item scale, 3-point scale): Absolute change: +0.04 Relative change: +1.8% (<math>p &gt; 0.05</math>, between)</p>

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Girgis et al., 1993 Australia RCT Greatest suitability Good quality</p>	<p>F/U: 8 months from end of I N=648 Limitations: Secular time</p>	<p>Mean age: 10y Female: 53% Race/ethnicity: NR SES: father-NR (53%); 32.6% low income; 15.3% high income</p>	<p>I-1: Standard: 30 minute didactic lecture focusing on dissemination of information; included posters and sunscreen samples I-2: Intensive: Skin Safe skin protection program incorporated into teachers' curriculum, consisting of cooperative learning techniques, student participation, problem-based strategies to promote awareness of problems and potential solutions associated with solar exposure, encouragement of students to develop responsibility for their own welfare by critically examining and improving their own environment C: No intervention</p>	<p><b>Child composite sun- protective behaviors</b> (odds ratio using intervention groups as variable): I-1: Absolute change: -0.15 Relative change: -15.0% I-2: Absolute change: +2.06 Relative change: +206.0%  Overall <i>p</i> value &lt; 0.001</p>

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Gooderham et al., 1999 Canada Before-and-after study Least suitable Good quality</p>	<p>F/U: 1 month from B/L n = 216 Limitations: Nonvalidated self-reported outcome measures; before-and-after study design with questionable use of analysis of variance statistical testing; potential for test-retest bias away from the null</p>	<p>Mean age: NR Range: (9–10y) % Female: 47% Race/Ethnicity: 90% White; 3% American Indian or Alaskan Native; 2% Asian; 2% East Indian; 1% Black; 2% Other</p>	<p>Sun awareness education program consisting of two 1-hour presentations, sun awareness activity booklet, sun safety workbook, take-home educational materials, and incentives</p>	<p>Child sun-protective behaviors (3-point scale):            Always wear a long-sleeved shirt:            Absolute change: +3.0            Relative change: +100.0%            (<math>p &lt; 0.001</math>, within)            Always wear long pants:            Absolute change: +7.0            Relative change: +175.0%            (<math>p &lt; 0.001</math>, within)            Always wear hat when outside:            Absolute change: +16.0            Relative change: +69.6%            (<math>p &lt; 0.001</math>, within)            Always wear sunscreen when outdoors in summer:            Absolute change: +13.0            Relative change: +31.7%            (<math>p &lt; 0.001</math>, within)</p>

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Hoffman et al., 1999 Florida Nonrandomized trial Greatest suitability Good quality</p>	<p>F/U: 2 weeks from end of I n = 181 Limitations: School size not described; convenience sample of schools; no validation of assessment tool; self-reported outcome measures</p>	<p>Mean age: NR (5th graders) % Female: 52% Race/Ethnicity: 81% White; 9% African American; 2% Hispanic; 8% Other SES: Based on Hollingshead 1975: 0% Strata 1; 6.5% Strata 2; 17% Strata 3; 38% Strata 4; 37% Strata 5</p>	<p>I: Lecture and interactive intervention given to 5th grade science classes to relay information on sun's effect on the skin, evaluate students' risks inherent in sun exposure, and promote change toward sunscreen use; included 10 minute ACS video, proper sunscreen application, student produced videotaped commercials emphasizing UV exposure dangers and methods to reduce, homework assignments, and brochures for parents C: No intervention</p>	<p>Sunscreen use (visual analog scale, mean score): Absolute change: +17.6 Relative change: +148.7%</p>

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Hornung et al., 2000 North Carolina RCT Greatest suitability Good quality</p>	<p>F/U: 7 months from end of I n = 192 Limitations: Extremely limited description of standard didactic presentation; no description of actual provision of the intervention; group rather than individual interaction with CD-ROM may have limited individual participation; no validation of behavioral measures</p>	<p>Mean age: 8.5y % Female: 44% Race/Ethnicity: NR SES: NR</p>	<p>I-1: CD-ROM sun safety game and interactive activities, modified for grades 3 and 4, supplemented by AAD pamphlets and information sheet I-2: Standard didactic sun safety curriculum</p>	<p><b>Child composite behavior</b> (shade and sunscreen use) (100 point): I-1: Absolute change: -0.6 Relative change: -1.4% (p-value NR, between) I-2: Absolute change: -3.8 Relative change: -7.3% (p-value NR, between)</p>

Author, Year Location; Study Design; Design Suitability; Study Quality	Follow-up interval n Limitations Race/Ethnicity SES	Demographics: Age Sex	Intervention (behavioral and health outcomes only), p-value, within or between groups	Results: Summary Effect Measures
<p>Milne et al., 2000                      Australia                      Nonrandomized trial                      Greatest suitability                      Good quality</p>	<p>F/U: 1.5y from baseline                      n = 1386                      Limitations: Reliance on self-reported outcome measures</p>	<p>Mean age: 6y                      % Female: 48.2%                      Race/ethnicity: 9.7% Southern European ancestry: 90.3% other                      SES: parents—59.3% high school or less; 40.6% tertiary education</p>	<p>I-1: Moderate group received “Kidskin” curricula comprised of developmentally appropriate, learner-centered skill and outcome based materials, classroom and home-based activities, and guidelines for providing a sun-protective school environment                      I-2: High intervention group received same intervention as the Moderate group and were also mailed program materials over the summer holidays, offered low-cost sun protective swimwear, and were actively assisted to introduce and formalize policies to provide a sunprotective school environment                      C: Regional standard Western Australian Health Education curricula</p>	<p><b>Child sun-protective behaviors or assessments:</b>                      Time spent outdoors during peak UV hours (adjusted mean):                      I-1:                      Absolute change: -4.3                      Relative change: -8.3%                      I-2:                      Absolute change: -6.1                      Relative change: -21.6% (p = 0.01, between)                      Covered back entire time:                      I-1:                      Absolute change: +14.3                      Relative change: +24.6%                      I-2:                      Absolute change: +9.1                      Relative change: +17.5% (p = 0.001; between)                      Wore hat entire time:                      I-1:                      Absolute change: -0.3                      Relative change: -1.4%                      I-2:                      Absolute change: -3.3                      Relative change: -6.3% (p = 0.6, between)                      Wore protective swimwear:                      I-1:                      Absolute change: +20.2                      Relative change: +30.1%                      I-2:                      Absolute change: +5.9                      Relative change: +11.3% (p = 0.0005, between)                      Use shade more than half the time:                      I-1:                      Absolute change: +10.2                      Relative change: +31.2%                      I-2:                      Absolute change: +5.3                      Relative change: +10.2% (p=0.09, between)                      15 exposure to face:                      I-1:                      Absolute change: -1.0                      Relative change: +1.9%</p>

AAD American Academy of Dermatology; ACS American Cancer Society; B/L baseline; C comparison; F/U follow up; I intervention; n sample size; NR not reported; RCT randomized control trial; SES socioeconomic status; UV ultraviolet; y year(s)

## Included Studies

Bastuji-Garin S, Grob JJ, Groggnard C, Grosjean F. Melanoma prevention: evaluation of a Health Education Campaign for Primary Schools. *Arch Dermatol* 1999;135:936-40.

Buller DB, Buller MK, Beach B, Ertl G. Sunny days, healthy ways: evaluation of a skin cancer prevention curriculum for elementary school-aged children. *Journal of the American Academy of Dermatology* 1996;35(6):911-22.

Buller DB, Hall JR, Powers PJ, et al. Evaluation of the "Sunny Days, Healthy Ways" sun safety CD-ROM program for children in grades 4 and 5. *Cancer Prev Control* 1999;3(3):188-95.

Buller MK, Goldberg G, Buller DB. SunSmart Day: A Pilot Program for photoprotection education. *Pediatric Dermatology* 1997;14(4):257-63.

Buller MK, Loescher LJ, Buller DB. "Sunshine and skin health": a curriculum for skin cancer prevention education. *Journal of Cancer Education* 1994;9(3):155-62.

DeLong M, LaBat K, Gahring S, Nelson N, Leung L. Implications of an educational intervention program designed to increase young adolescents' awareness of hats for sun protection. *Clothing & Textiles Research Journal* 1999;17(2):73-83.

Dietrich AJ, Olson AL, Sox CH, et al. A community-based randomized trial encouraging sun protection for children. *Pediatrics* 1998;102(6):E64.

Dietrich AJ, Olson AL, Sox CH, Tosteson TD, Grant-Petersson J. Persistent increase in children's sun protection in a randomized controlled community trial. *Prev Med* 2000;31(5):569-74.

Dietrich AJ, Olson AL, Sox CH, Winchell CW, Grant-Petersson J, Collison DW. Sun protection counseling for children: primary care practice patterns and effect of an intervention on clinicians. *Arch Fam Med* 2000;9(2):155-9.

Girgis A, Sanson-Fisher RW, Tripodi DA, Golding T. Evaluation of interventions to improve solar protection in primary schools. *Health Education Quarterly* 1993;20(2):275-87.

Gooderham MJ, Guenther L. Impact of a sun awareness curriculum on medical students' knowledge, attitudes, and behaviour. *Journal of Cutaneous Medicine & Surgery* 1999;3(4):182-7.

Gooderham MJ, Guenther L. Sun and the skin: evaluation of a sun awareness program for elementary school students and the skin: evaluation of a sun awareness program for elementary school students. *Journal of Cutaneous Medicine & Surgery* 1999;3(5):230-5.

Grant-Petersson J, Dietrich AJ, Sox CH, Winchell CW, Stevens MM. Promoting sun protection in elementary schools and child care settings: the SunSafe Project. *Journal of School Health* 1999;69(3):100-6.

- Hoffmann RG, III, Rodrigue JR, Johnson JH. - Effectiveness of a school-based program to enhance knowledge of sun exposure: Attitudes toward sun exposure and sunscreen use among children. *Children's Health Care* 1999;28(1):Win-86.
- Hornung RL, Lennon PA, Garrett JM, DeVellis RF, Weinberg PD, Strecher VJ. Interactive Computer Technology for Skin Cancer Prevention Targeting Children. *American Journal of Preventative Medicine* 2000;18(1):69-76.
- Hughes AS. Sun protection and younger Children: lessons from the Living with Sunshine program. *Journal of School Health* 1994;64(5):201-4.
- Labat KL, DeLong MR, Gahring S. Evaluation of a skin cancer intervention program for youth. *J Family Consumer Sci* 1996;88:3-10.
- McWhirter JM, Collins M, Bryant I, Wetton NM, Bishop JN. Evaluating 'Safe in the Sun', a curriculum programme for primary schools. *Health Educ Res* 2000;15(2):203-17.
- Milne E, Corti B, English DR, Cross D, Costa C, Johnston R. The use of observational methods for monitoring sun-protection activities in schools. *Health Educ Res* 1999;14(2):167-75.
- Milne E, English DR, Corti B, et al. Direct measurement of sun protection in primary schools. *Prev Med* 1999;29(1):45-52.
- Milne E, English DR, Cross D, Corti B, Costa C, Johnston R. Evaluation of an intervention to reduce sun exposure in children: design and baseline results. *Am J Epidemiol* 1999;150(2):164-73.
- Milne E, English DR, Johnston R, et al. Improved sun protection behaviour in children after two years of the Kidskin intervention. *Aust N Z J Public Health* 2000;24(5):481-7.
- Olson AL, Dietrich AJ, Sox CH, Stevens MM, Winchell CW, Ahles TA. Solar protection of children at the beach. *Pediatrics* 1997;99(6):E11.
- Reding DJ, Fischer V, Gunderson P, Lappe K. Skin cancer prevention: a peer education model. *Wisconsin Medical Journal* 1995;94(2):77-81.
- Reding DJ, Fischer V, Gunderson P, Lappe K, Anderson H, Calvert G. Teens teach skin cancer prevention. *Journal of Rural Health* 1996;12((4 suppl S)):2650272.
- Schofield MJ, Edwards K, Pearce R. Effectiveness of two strategies for dissemination of sun-protection policy in New South Wales primary and secondary schools. *Australian & New Zealand Journal of Public Health* 1997;21(7):743-50.
- Thornton C, Piacquadio DJ. Promoting Sun Awareness: Evaluation of an Educational Children's Book. *Pediatrics* 1996;98(1):52-5.
- Vitols P, Oates RK. Teaching children about skin cancer prevention: why wait for adolescence? *Australian & New Zealand Journal of Public Health* 1997;21(6):602-5.

## Disclaimer

The findings and conclusions on this page are those of the Community Preventive Services Task Force and do not necessarily represent those of CDC. Task Force evidence-based recommendations are not mandates for compliance or spending. Instead, they provide information and options for decision makers and stakeholders to consider when determining which programs, services, and policies best meet the needs, preferences, available resources, and constraints of their constituents.

Document last updated January 6, 2014