Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: a systematic review


CRD summary
This review assessed interventions to prevent skin cancer by reducing exposure to ultraviolet radiation. The authors concluded that education and policy approaches in primary schools and in recreational and tourist settings are effective in increasing sun-protective behaviours, but evidence for other interventions is insufficient. The conclusions may not be reliable as they were partly based on poor-quality evidence.

Authors’ objectives
To assess the effectiveness, applicability, other harms or benefits, economic evaluations, and barriers to the use of selected interventions to prevent skin cancer by reducing exposure to ultraviolet radiation.

Searching
MEDLINE, PsycINFO and CINAHL were searched from 1966 to June 2000 for English language papers; the search terms were reported. Strategies for locating further published or unpublished studies included checking the references of retrieved articles, contacting experts in the field and checking an Environmental Protection Agency-sponsored e-mail discussion group.

Study selection
Study designs of evaluations included in the review
No criteria were specified for study design. Experimental studies, before-and-after studies and time series were included in the review.

Specific interventions included in the review
Studies that evaluated a specified population-based intervention for the primary prevention of skin cancer were eligible for inclusion. The studies were required to compare a group of people who had been exposed to the intervention with either a group of people who had not been exposed or who had been less exposed. Four types of intervention were included in the review: environmental and policy interventions (in a variety of settings); mass media campaigns; interventions targeted at individual caregivers; and community-wide multicomponent programmes.

Participants included in the review
The studies were required to have been conducted in an established market economy, as defined by the World Bank. Where reported, the participants in the included studies were in child care primary school and secondary school settings, recreational and tourist settings, outdoor occupational settings, and healthcare system and provider settings.

Outcomes assessed in the review
The studies were required to evaluate the effectiveness of the intervention, assessing at least one outcome from a specified framework, and/or to provide information on the applicability, harms or side-effects, economic evaluation, or barriers to intervention implementation. The effectiveness outcomes included in the review were sun-protective behaviours (sun avoidance, protective clothing, use of sunscreen), intermediate outcomes associated with these behaviours (e.g. knowledge, attitudes, intentions and environmental characteristics), selected health outcomes (e.g. sunburn, nevi) and policy outcomes.

How were decisions on the relevance of primary studies made?
The authors did not explicitly state how the papers were selected for the review, or how many reviewers performed the selection. It appears that a team of reviewers was involved.
Assessment of study quality
Study quality was assessed using a standardised Community Guide form (see Other Publications of Related Interest no.1), which examined the following: design and analysis, description of the target population and context, description of the intervention, duration of the intervention, length of follow-up, intervention quality, measurement of exposure and measurement of outcomes. Only studies of good or fair methodological quality were included in the review. Review team members extracted data on study quality and resolved any disagreements by consensus.

Data extraction
Review team members extracted the data onto a standardised form and resolved any disagreements by consensus.

Methods of synthesis
How were the studies combined?
For each intervention type and setting, the studies were combined in a narrative. For some outcomes, the median, 25th and 75th percentile effects across studies were reported.

How were differences between studies investigated?
Differences between the studies were discussed within the narrative, and summary measures were reported by study design.

Results of the review
Forty-one of the 126 studies meeting the inclusion criteria were excluded because of insufficient methodological quality. Eighty-five studies were therefore included in the review: 55 studies with experimental designs, 26 before-and-after studies and 4 time series. It was not reported how many participants were involved.

A number of methodological weaknesses of the studies were highlighted. Such weaknesses included the lack of a concurrent control group, poor reporting of the participants and the intervention, short length of follow-up (less than 3 months in half of the studies) and a reliance in most of the studies on self-reporting of outcomes.

Only the results for the primary behaviour and policy outcomes are summarised here. Additional results on knowledge, attitudes and other outcomes were given in the report.

Child care centre settings (2 studies): one study did not report policy or behaviour outcomes, while the other found no significant effect on these. Primary school settings (20 studies): the interventions were consistently associated with an increase in covering-up behaviour; the median relative increase was 25% in studies with concurrent control groups and 70% in before-and-after studies. Evidence for other sun-protective behaviours was less consistent. Only one study examined the effect on policy: while there were improvements in the adoption of a sun-protection policy, there was no effect on sun-protective behaviours.

Secondary school settings (13 studies): only 4 studies examined changes in behaviour or policy and each focused on a different behaviour measure.

Recreational or tourist settings (11 studies): 3 studies demonstrated a positive effect on the adult sun-protective behaviour of wearing protective clothing, though evidence on adult incidence of sunburn was inconsistent. Six studies of sun-protective behaviour amongst children showed inconsistent results, though there was evidence of effectiveness for children's sunscreen use.

Outdoor occupational settings (8 studies): several studies examined sun-protective behaviours, but there was insufficient evidence to determine the effectiveness of the interventions. Two reports demonstrated positive effects on sun safety measures and environmental supports at recreational centres and swimming pools.

Health care system and provider settings (11 studies): 2 studies assessed provider behaviour towards clients, but the results were inconsistent.
Mass media campaigns (3 studies): it was not possible to assess specific sun-safe behaviours from the information provided by the 2 studies measuring behaviour change.

Interventions targeted at caregivers (9 studies): the results for both the parents' and children's sun-protective behaviours were inconsistent.

Community-wide programmes (8 studies): for sun-avoidance or covering-up behaviours, 4 studies showed positive outcomes while 3 studies found no significant change. Two studies showed positive effects on policy outcomes.

**Authors' conclusions**

Education and policy approaches to increasing sun-protective behaviours were effective when implemented in primary schools and in recreational and tourist settings. There was insufficient evidence to determine the effectiveness of these approaches in child care centres, secondary schools and colleges and occupational settings, or of interventions oriented towards health care settings and providers, parents or caregivers of children, media campaigns alone, or community-wide multicomponent interventions.

**CRD commentary**

The review question and inclusion criteria were reasonably clear. The search for primary studies involved several relevant sources, although only papers published in English were sought; this means that relevant studies might have been missed. The involvement of a team of reviewers might have minimised bias and error in the review process, but the process was not described clearly. While studies that did not meet a specified quality standard were excluded, which should have increased the reliability of the review, the cut-off point might have been too low. The authors highlighted a number of methodological limitations in the included studies. There were also no restrictions on study design, meaning that designs inherently subject to bias were included in the review (e.g. before-and-after studies). The studies were grouped appropriately and, although detailed information was only provided for selected studies, the synthesis appeared thorough and appropriate, and firm conclusions were drawn only where the evidence was judged sufficient. This was a generally well-conducted review, but the conclusions were based partly on poor-quality evidence and this limits their reliability.

**Implications of the review for practice and research**

Practice: The authors stated that educational and policy interventions in primary schools, as well as programmes for adults in outdoor recreational or tourism settings, can be recommended to improve sun-avoidance or covering-up behaviours.

Research: The authors stated that further studies of high methodological quality and measuring key behavioural and health outcomes are required, especially in the areas in which insufficient evidence was found.

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**Other publications of related interest**


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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.