OF INTEREST

The Development of a School-based Teaching Resource Package for Adolescent Skin Cancer Prevention

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Abstract

Issue addressed: Melanoma is still the third most common potentially fatal cancer in Australia. Reducing sun exposure among adolescents is recognised as one important strategy for making an impact on this rising toll, however few comprehensive interventions have targeted this issue. This paper describes the processes involved in the Skin Cancer And Teenagers (SCAT) project, a randomised control study based on educational interventions which were developed in response to this issue.

Methods: This intersectoral intervention was developed through a partnership of university, non-government and government agencies and, most importantly, teachers and students who were to use the program. The intervention consisted of three sequenced education modules designed to be implemented over school Years 8, 9 and 10. The program was based on a range of behavioural theories and focussed on the integration of sun protection behaviours and other social and environmental factors related to sun protection.

Conclusion: This paper provides an overview of the processes involved in the design, implementation and evaluation of a school-based skin cancer prevention project. Particular emphasis is placed on intersectoral partnerships as a strategy for overcoming the challenges of the current climate of rapid change.

So what? The greatest need in skin cancer prevention research is in the translation of what is already known into the practical realm of populations and communities. This paper offers an integrated approach to the design, implementation and evaluation of school-based skin cancer prevention programs with a view to encouraging similar studies which extend current knowledge.

Key words: Adolescent, skin cancer prevention, melanoma, intervention

Introduction

Melanoma is the third most common potentially fatal cancer\textsuperscript{1,2} and non-melanocytic skin cancer accounts for the highest health-care costs of any neoplasm in Australia.\textsuperscript{3} Within Australia, Queensland has the highest incidence rate of skin cancer, where the climate and related lifestyle factors facilitate the vulnerability of the population to sun exposure.\textsuperscript{4-6} Epidemiological evidence implicates childhood (and teenage) exposure as an important cause of skin cancer, and early exposure accounts for a large proportion of lifetime exposure and increased risk of skin cancer.\textsuperscript{7,8,9,10,11} Given these factors and the considerable potential for preventing the majority of skin cancers by reducing sun exposure in the early years, changing sun-related behaviours in young people has emerged as a priority.\textsuperscript{6,8,12,13,14}

Primary prevention of skin cancer is, therefore, concerned with reducing the risks associated with sun exposure through environmental change, social change, and behavioural change.

Examples of the content of education strategies across these three risk areas include:

Environmental change: creating more shade;

Social change: supporting social norms which promote sun protection; and

Behavioural change: supporting personal protection, such as wearing hats and protective clothing, using sunscreen, staying in the shade, and not being in the sun between 10.00 a.m. and 2.00 p.m.

Studies which have investigated the primary prevention activities of population groups in Australia have demonstrated (among other findings) that children use inadequate levels of sun protection,\textsuperscript{12,13} and that parental sun protection behaviour is one of the main influences on young children’s behaviour.\textsuperscript{14} For adolescents, exposure to the sun was found to be more strongly influenced by peers than other sources of influence and use of sun protection measures was low despite a high level of knowledge of sun protection issues.\textsuperscript{15} Generally, levels of acceptability of sun protection and fashion trends influenced the choice of sun protection favoured by adolescents, and males were less likely than females to protect themselves from the sun.\textsuperscript{12}

As part of an overall strategy to improve sun protection among adolescents, school-based programs provide a focal point for such activities. The purpose of this article is to describe the framework for the design and evaluation of a large intersectoral intervention study conducted in Queensland secondary schools. The goal of the project was to reduce the risks associated with the development of skin cancer.
Overview of the Skin Cancer And Teenagers (SCAT) Project

The Skin Cancer And Teenagers (SCAT) project was developed in response to a clear need to increase skin protection, especially in Queensland. In particular, this intersectoral intervention emerged from concerns about the need to educate young people about over-exposure to the sun. Preliminary studies with primary and secondary school students showed that knowledge of skin cancer and necessary preventive measures was extremely high, even among young students. However, skin protection behaviours were not uniformly practised. Given the high potential for prevention of skin cancer, an educational intervention designed to have an impact on risk factors for skin cancer was developed. In addition, the dearth of evaluation studies of education interventions related to skin cancer prevention supported the need for practical research.

Project initiation

The project was initiated in 1992 as a five-year intervention study implemented in secondary schools. The project was a joint initiative of, and jointly managed by, a committee including the Health and Education sectors, the state Cancer organisation and the research group. The project was funded for two years by Queensland Health and the following three years by the National Health and Medical Research Council.

The study used a randomised controlled trial design. Twenty-six schools were paired and randomly allocated to intervention (n=13) or control/usual care (n=13) condition. The school therefore was the principal unit of change. As such, the focus of the study was on designing an intervention which was successful across various schools of differing size and socioeconomic status, rather than the more common aim of having an impact on individuals within the same (or similar) settings. The intervention consisted of a four- to six-week educational module delivered by the regular classroom teachers in the intervention school in the first three years of high school — Years 8, 9, and 10 — when students are an average age of 13, 14, and 15 years (respectively). The three modules were designed to build progressively over the three years. Tracking and monitoring in the intervention schools continued through the remaining two years of high school (Years 11 and 12). The control schools received no formal intervention but were monitored from Year 8 through Year 12.

The central activity during the initiation of the project involved liaison with the schools to maximise their support and participation. With endorsement of central office of the Queensland Department of Education and the Queensland Cancer Fund, schools were invited to participate in the study. The project coordinator then visited each of the 26 schools in the study to explain details of the project and to promote support from school administrators. Persons requested to be present at the school-based meetings included the principal or relevant administrative representative, a representative from the school’s Health and Physical Education Department, and a representative from the parent organisation at the school. This process proved critical to establishment of effective liaison with the schools.

Initial development of the intervention

Development of the resources was based on four major sources of information:

- behavioural theory;
- previous research;
- curriculum requirements; and
- existing health and sun protection resources.

1. Behavioural theory

Development of the resources was underpinned primarily by Social Cognitive Theory, the Health Belief Model, and the Stages of Change Model. An eclectic approach to the application of these theories was evident in the lesson program which incorporated the concepts of severity, susceptibility, consequences, barriers and benefits, self-efficacy, modelling, reinforcement, and the stages of change from precontemplation to maintenance.

In addition, particular characteristics of young people, such as their tendency to be more attentive to short-term versus longer-term effects of behaviour, their interest in personal appearance, and the nature of sun-related behaviours in the school environment were considered important contextual factors in the development of the resources.

2. Previous research

The results of a cross-sectional study investigating the sun-related knowledge and attitudes of 3655 students between Years 7 and 11 in 55 state government schools across Queensland informed the development of the educational modules. Results of this research indicated that skin cancer prevention knowledge levels were quite high from Year 7 through to the senior high school years, although some inaccuracies in student knowledge were evident, and some attitudes were less than optimal for behaviour change to occur. Sun exposure was perceived as quite serious and most students understood that susceptibility to skin cancer is high. However, a strong pro-tan attitude was evident, with greatest acceptance in the higher year levels. In addition, some misconceptions were evident regarding protection from the sun and some distinct preferences for certain methods (for example, sunscreen for females and hats/caps for males) over other methods were identified. Detailed results are reported elsewhere.
Relevant knowledge levels and many attitudinal aspects were quite positive, but these did not translate into higher levels of sun protection behaviour. Knowledge alone is generally not considered sufficient to change behaviours, however, a minimum core of accurate knowledge is important to support behaviour change.\textsuperscript{29} Given this and the high knowledge levels of Queensland students, the focus of the modules was moved away from traditional approaches which rely on knowledge, in favour of approaches which challenge attitudes and support skills development. In addition, characteristics of the target group highlighted in previous research\textsuperscript{1} suggested that the immediate effects of the sun (such as sunburn) and risk factors for skin damage (such as tanning and peer acceptance of sun-related behaviours) should be the focus, with less emphasis on long-term outcomes, such as skin cancer per se.

3. Curriculum requirements
The requirements of the school health curriculum at the time supported a developmental progression of concepts and principles at each Year level which the intervention classroom activities needed to support. In addition, the intervention needed to be flexible to allow for inevitable changes to curriculum, including the national curriculum initiatives.

4. Existing health and sun protection resources
In the early stages of the project, a nationwide audit of relevant secondary schools' skin cancer prevention education materials was conducted. The need for new resources was highlighted by the finding that even though a number of pamphlets, posters and promotional materials were available, sequenced lesson programs for secondary schools were lacking.

The final teaching resource
The four major sources of input described above were utilised in the development of the final intervention resources through a series of development workshops. Expertise was drawn from researchers, cancer specialist organisations, teachers, students and parents, to facilitate the development of the resource materials for the intervention. The workshop series resulted in a draft lesson package which was then piloted.

The draft resources were piloted in schools located in areas away from, but representative of those in the study regions. The focus of the pilot was on the processes involved, such as teacher and student acceptance of the resource, suitability of the level of complexity of the resource, readability and suitability of time allocation.

The teaching resource was designed to be self-contained and consisted of four core lessons for each Year level, with additional ‘optional’ extension lessons. Each of the core lessons were preceded by an overview which outlined the aim and objectives, provided teacher notes, student worksheets and described the overall lesson flow. The lessons explored social, environmental and personal issues, with a focus on motivating students to take responsibility for, and to be involved in, promoting sun safety. The sequencing of the lessons were directly influenced by the four major sources of information described above.

The Year 8 teaching resource focussed on cognitive strategies designed to capitalise on habits reinforced in primary school, largely a result of the “no hat, no play” policies prevalent in Queensland primary schools. Implications from the earlier research\textsuperscript{1} were addressed in this resource by including estimates of level of individual risk, increasing sun safety in the environment and planning ahead for sun safety, or making sun safety more generally available and demonstrating concern about the level of sun safety exhibited by peers.

Previous research and behaviour change theories supported a focus in the Year 9 module on personal self-image and the role of the mass media in favouring certain images. Classroom strategies centred around perceptions of susceptibility and severity in relation to sun damage, attitudes to sun damage and tanning in particular, consequences related to exposure to the sun and images promoted in the media. Some specific myths about sun exposure which emerged in the earlier research were explored.

The Year 10 resource was designed to develop core process skills which students could apply at school and elsewhere. The lessons focussed on encouraging students to analyse attitudes and motivation for health-enhancing behaviours, with an emphasis on sun-related behaviours. Based on the initial literature review, the lessons directed more attention to sun-related attitudes and behaviours than to the accumulation of further knowledge. The resource attempted to address current concerns of young people, so that skin cancer was presented as just one of the possible consequences associated with exposure to the sun amid a range of more immediate effects. As such, long-term consequences were included but deliberately not emphasised.

The intervention extended the focus of previous Year levels to include creation of shade, modification of school practices to reduce sun exposure, modelling of sun-safe clothes, advertising and media images of tanning, sun-seeking, and preventing skin damage from the sun. Parents, teachers and members of the broader community were invited to participate in aspects of the intervention. Concurrent public campaigns and available adjunct community resources were utilised where possible throughout the intervention.
This practice allowed for considerable reinforcement of existing messages through school programs. The resource package used in the study contained all the materials required to teach lessons, including lesson plans, overhead projector transparencies, class sets of all worksheets for students and reference materials. The resource booklet included evaluation sheets for the teachers to use after they had taught each of the lessons. As such, schools were not required to outlay any print resources to present the lessons.

**Teacher in-service**

Teachers (minimum of two) from each of the intervention schools involved with teaching the modules, were provided with teacher replacement resources to attend in-service meetings each year just prior to teaching the modules in Term 4. These teachers then in-serviced other colleagues as necessary. Close contact between study staff and teaching staff was maintained to ensure the adequacy of colleague in-service. Term 4 was considered the most suitable time so that students received the intervention just prior to summer each year.

**Overview of the evaluation design**

**The sample**

To achieve the final sample of 13 pair-matched schools, all high schools from three non-metropolitan State Education Department Regions were pair-matched according to geographic location (beach, coastal, inland), size (number of students in the junior school), and socioeconomic status (using Australian Bureau of Statistics measures of socioeconomic advantage). Schools which could not be adequately matched were omitted from the sample. In total 26 schools were paired successfully and then randomly allocated to intervention (n=13) or control/usual care (n=13).

All students in Year 8 classes from the selected schools participated in the study. The minimal student movement into and out of the study schools was tracked; however, no measurable effect on the study was detected. Table 1 shows the final pair matches and provides a summary of the demographics of the study schools. One pair shown in Table 1 was lost due to discontinued participation by a school.

**Evaluation measures**

The range of impact, outcome and process measures collected throughout the project are described below.

**Impact measures:** Pre- and post-tests were conducted with students within two weeks of each intervention module to indicate short-term impact. The impact measures included items regarding knowledge, attitudes and behaviours specific to the immediate module being taught.

**Outcome measures:** Longer-term attitudinal and behavioural risk measures were collected via an initial pre-test survey, and post-test surveys at the completion of the intervention each year. Items included exposure to the sun and sun avoidance, seeking and using protection from the sun, and attitudinal items relating to tanning, sun protection and the behaviour of significant others. The students were also asked questions about their current sun protection behaviour in relation to weekend activities and their responses were used to compare with school-day activities. The outcome surveys were designed to trace longer-term outcome changes and to facilitate comparisons over time.

In addition, outdoor lesson observations during physical education classes were conducted by independent observers known to the teachers and students (for example, other staff members). Each class in every school in the study (intervention and control) was observed annually, just prior to the intervention being taught each year. The observers collected information about the use of sunscreens, shade and hats, the clothing worn by students and teachers, the time and location of the activity and a

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Location</th>
<th>Number of students in junior high school, 1992</th>
<th>Socioeconomic status</th>
</tr>
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<tr>
<td>Intervention 1</td>
<td>Inland</td>
<td>60</td>
<td>977.0</td>
</tr>
<tr>
<td>Control 1</td>
<td>Inland</td>
<td>136</td>
<td>973.9</td>
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<td>49</td>
<td>973.1</td>
</tr>
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</tr>
<tr>
<td>Control 3</td>
<td>Inland</td>
<td>58</td>
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<tr>
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<tr>
<td>Control 7</td>
<td>Inland</td>
<td>160</td>
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<tr>
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<tr>
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<td>Coastal</td>
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<tr>
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<td>Beach</td>
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<td>961.7</td>
</tr>
</tbody>
</table>

*Definitions: * Beach schools are located in a community that borders the ocean. Coastal schools are located in a community that is between 1 km to 50 km from the ocean. Inland schools are located in a community more than 50 km from the ocean.
description of the weather. The purpose was to obtain a baseline of student behaviour at the initial observation point and to monitor any changes in sun protection behaviours in the longer term.

**Process measures:** Process measures were designed to assess whether the intervention was delivered as intended. Two main types of process measures were used: lesson observation by independent observer, and teacher self-report of lessons.

Independent observers were employed to carry out a minimum of two random observations in each school, each intervention year. In an effort to reduce disruption and any Hawthorne effect, only teachers known to the school or regularly utilised for relief teaching were trained for this task and not every lesson was observed. As emphasised to each teacher, the observer was primarily concerned with compliance with the lesson plan as designed and not with individual teaching skill or style. A checklist of the lesson plan was completed by the observer, including information about whether or not each section of the lesson was completed, the timing and sequencing of activities and levels of student participation and interest.

The classroom teacher's self-report about the lessons consisted of scaled items about the appropriateness of the content and flow of the lesson, level of student participation and level of achievement of the lesson objectives. Open-ended comment was also encouraged. The completed form confirmed each lesson was taught and also provided quantitative and qualitative information about the lesson.

**Other data collections**

**School background**

Activities which may have an impact on skin cancer prevention and/or the study were also monitored as potential intervening variables. Data were gathered about the activities of local councils and service clubs, as well as from newspaper and television reports. School-based policies and activities relating to skin cancer and sun avoidance in the school were also monitored, especially in relation to school uniforms and the structuring of outdoor activities.

**Weather monitoring**

It would be expected that weather patterns affect outdoor behaviour; therefore, weather reports were obtained about temperature, cloud cover and rainfall for the period of the data collections. Study participants were also asked to complete general weather information relevant to the time of the data collection. These data were used to monitor the relationship between sun-related behaviours and the weather.

**Parents**

An impact survey of parents of Year 8 students was also conducted. This questionnaire sought information about parental sun avoidance behaviour and about their influence on their children's behaviour. Overall, the return rate of these questionnaires was disappointing and varied widely among schools (24 per cent to 95 per cent). Teachers from the schools reported that it was generally difficult to get 'compulsory' material to be returned to school and that the response to a request for a 'non-compulsory' questionnaire might be low. For this reason, the parent survey was discontinued; however, parent involvement in the study was maintained through the teaching activities, whereby students were required to complete some activities with their parents.

**Conclusion**

It has been argued that goals of the health sector are focussed on health outcomes and especially behaviour change, whereas the goals of education are focussed on 'educating' about health and that schools should not necessarily be responsible for changing behaviours. This study represents an acceptable combination of the distinct, yet compatible, agendas of the education and health sectors.

The strong intersectoral relationships fostered by this long-term study assisted in maintaining the momentum of the study and ultimately in minimising attrition. Sharing information, resources and strategies, and 'in kind' contributions afforded substantial efficiencies. Related effects included the ability to incorporate concurrent campaigns into the project, to reduce duplication of effort, and to enhance the potential synergism of reinforcing consistent messages using different strategies. Project resources (for Years 8 through 10) were also utilised very widely, beyond the study, through a range of mechanisms such as Health Promoting School networks, statewide and interstate skin cancer prevention campaigns and local and interstate government and non-government agencies.

Intersectoral partnerships were particularly important to weathering substantial changes imposed by several restructures of various sectors and organisations relevant to the study. While a reliance on collaboration was an important strategy for dealing with the demands of such a large, long-term study, the observably high rate of changes in government structures, personnel and curriculum frameworks stands out as an important delimitation. Such change is rarely accurately predicted and accommodated. Over the course of this study, it is difficult to identify major factors which did not change in the course of the project. Increasingly, schools and those working in schools (and many other areas) need to be creative about the sustainability of their input.
As a five-year longitudinal intervention study with high-school students, this study is the largest worldwide to be conducted in the area of skin cancer prevention to date. While this fact sounds impressive, it also reiterates the lack of studies of this kind. However, the greatest need in skin cancer prevention research is not in the further definition of risk factors and pursuit of greater epidemiological precision, but rather in the translation of what is already known into the practical realm of populations and communities.

In the school context alone, too little is known about what facilitates or enhances the adoption of programs, let alone the circumstances under which observable reductions in risk factors for skin cancer can be expected over time. There is a clear need to broaden attention to process measures and indicators of enhanced 'capacity' to reduce risk factors for skin cancer, before we can focus on the more limiting outcome indicators of behaviour change. Despite the considerable expertise and continued support required for such studies, there is a need for ongoing advocacy for large-scale intervention studies which extend on existing studies and allow for evaluation of both theoretical and practical aspects of health behaviour change — and which ultimately can contribute a great deal to the refinement of best practice in health.

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