Impacts from repeated mass media campaigns to promote sun protection in Australia

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SUMMARY

Campaigns using television, radio and print media were conducted over three summers in New South Wales, Australia, aiming to increase the use of sun protection measures among children under 12 years. The evaluation entailed cross-sectional telephone surveys before and after each of the first two campaigns and following the third campaign. The study group were parents of children under 12 years. Random digit dialling yielded samples of approximately 800 for each survey. Measures addressed campaign recall and sun protection knowledge, attitudes and behaviours. The surveys revealed significant levels of campaign recall. Knowledge about the protective benefits of sunscreens, hats and protective clothing was high at baseline and showed little improvement over the campaigns. Knowledge levels about the benefits of shade cover and of the relative risks of skin cancer from childhood sun exposure were lower, and also did not show improvement. Just one of the four attitude factors showed significant improvement, and this concerned the importance that parents placed on the issue of child sun protection. After the final campaign there were increases compared with baseline in childrens’ use of sunscreen, protective clothing and shade, but it was notable that between campaigns levels of these behaviours were similar to or below those at baseline. There was no evidence of a campaign-related increase in hat wearing by children. All sun protection measures were used less often by adults than children, but these showed similar trends. Mass media campaigns may contribute to short-term increases in some sun protection behaviours; however, as their impact is not sustained they should be repeated and supplemented by educational, policy and environmental strategies.

Key words: Australia; campaigns; media; sun protection

INTRODUCTION

Skin cancer has emerged in recent decades as one of the 10 most frequent cancers in Australia, New Zealand, Canada, the United States and a number of Western European nations (Parkin et al., 1997). Concern about this problem was heightened during the 1970s and 1980s when there were marked annual increases (3–10%) in malignant melanomas in many caucasian populations (Coleman et al., 1993). In Australia, the diagnosis and treatment of new cases of skin cancer places a greater burden on the Australian health system than any other cancer. While the incidence of basal cell carcinoma and melanoma in people under the age of 55 years has recently shown signs of plateauing in Australia (AIHW, 1998), the control of skin cancer remains one of
this nation’s health priorities (Nutbeam et al., 1993).

Children under 12 years of age represent a key target group in efforts to control skin cancer. Epidemiological evidence indicates that childhood exposure to solar ultraviolet radiation is a strong determinant of the lifetime risk of most forms of skin cancer (Marks et al., 1990; Mackie, 1992). Armstrong estimates that living in Australia for the first 15 years of life contributes about two-thirds of the lifetime risk of melanoma of a lifelong resident (Armstrong, 1997).

The mass media has been widely used in public health programmes to address behavioural risk factors, and is one of the strategies that can be used in efforts to prevent skin cancer. Evaluations of mass media campaigns concerned with smoking (Flay, 1987; Pierce et al., 1990), physical activity (Owen et al., 1995; Marcus et al., 1998) and multiple cardiovascular risk factors (Luepker et al., 1994) indicate that these can be effective in raising awareness, but have less clear benefit in increasing knowledge or changing behaviours. Factors that enhance the effectiveness of campaigns include using behavioural theory to target messages (Flora et al., 1989), formative testing of messages with the target audience (Novelli, 1990), linking messages with credible sources (Wilde, 1993) and maximising the frequency, duration and reach of the media delivery (Flay, 1987). In the area of skin cancer control, evidence about the effectiveness of mass media campaigns has been limited by study design and measurement problems. Studies have reported associations between mass media campaigns and increases in medical consultations for skin checks (Healsmith et al., 1993; Lowe et al., 1994), increased knowledge of risk factors (Cameron and McGuire, 1990; Boutwell, 1995), higher rates of hat wearing and reduced incidence of sunburn (Hill et al., 1993). As indicated, however, the strength of this evidence is limited by a number of methodological issues.

The need for continued research and evaluation concerning the use of mass media campaigns for skin cancer prevention has been recognized (Carter et al., 1999). In countries like Australia, where there is widespread marketing of sun protection products, and well established prevention programmes in settings like schools and recreational venues, a salient research question concerns the value that mass media campaigns might add to existing prevention efforts. Following on from this are questions concerning the most effective duration and intensity of campaigns. Do repeat campaigns build upon those that precede them, or are there ceiling effects that reduce their marginal value?

In this paper we present the evaluation results from mass media sun protection campaigns that were conducted over three summers in New South Wales (NSW), Australia. These campaigns, which featured a cartoon character, Seymour the Snowman, were directed towards parents and carers of children (0–11 years), and were carried out by the NSW Cancer Council in partnership with the NSW Health Department. The findings that we present here enable examination of the range of impacts associated with this initiative, including awareness, knowledge, attitudes and sun protection behaviours. Furthermore, the evaluation design that was used provides insights into the value of repeated mass media campaigns for sun protection.

METHODS

The campaigns

These sun protection campaigns were designed to raise awareness among parents of the importance of providing adequate sun protection for their children and to encourage them to use protective measures such as clothing, hats and sunscreen. A multi-media advertising campaign featuring a cartoon character called Seymour the Snowman was conducted over three summers. The message Seymour conveyed was that by wearing protective clothing, a hat and sunscreen he avoided melting from the sun. The advertising in campaign one (C1) comprised a 30 second television commercial, supported by transit advertising (bus sides), outdoor advertising (billboards) and a 30 second radio community service announcement. The media mix for campaign two (C2) consisted of television, radio and transit advertising. In the third campaign (C3), the media was confined to television advertising and radio community service announcement. The media mix for campaign two (C2) consisted of television, radio and transit advertising. In the third campaign (C3), the media was confined to television advertising and radio community service announcements. Overall, as it was hoped that each campaign would add to the level of sun protection awareness achieved by those preceding it, there was a slight decline from C1 to C3 in the number of media advertising spots that were purchased.

Through the efforts of NSW Area Health Services and Regional Cancer Council staff, there was widespread support for the campaigns in local newspapers and on local radio and television
stations. Each year, the campaign launch also generated extensive coverage on metropolitan television and radio stations. Educational and promotional resources were developed for dissemination to parents and children. These included information flyers, posters, stickers and activity sheets. They were distributed through a range of settings including: baby health clinics, child care centres, schools, vacation care services, learn-to-swim programmes, guides and scouts groups, cinemas, surf clubs, libraries, sporting groups, swimming pools, health services, doctors’ surgeries and pharmacies.

Study design and sample
A before and after study design was used. Figure 1 shows that cross-sectional population surveys were conducted prior to and shortly after the first two campaigns, and at the end of the third campaign. The purpose of the final, post only survey was to examine if any impacts shown in earlier surveys were maintained.

The study population was adults living in NSW who were responsible for the care of at least one child under the age of 12 years. Sampling was undertaken by the research company AC Nielsen who carried out the surveys using Computer Assisted Telephone Interviewing. Households were contacted using random digit dialling. A sample size of 800 was selected to enable detection of differences of 5% in dependent variables in pre- and post-surveys using a \( \chi^2 \) statistic, assuming a prevalence of 50% of a variable at baseline. The survey samples were weighted in order to achieve an even representation of parents with children mostly <5 years old (50%) and with those mostly 6–11 years of age (50%), and people from urban and rural locations (50% from each). This was undertaken to ensure that the survey results were generalizable to the campaign target group.

Measures
The survey instrument was designed for telephone administration. In all surveys, campaign exposure was measured by asking respondents about their recent exposure to information or advertising about sun protection for children <12 years of age, followed by open-ended questions about what they remembered.

Sun protection knowledge was addressed in open-ended questions about what parents and carers thought they could do to reduce their child’s risks of getting skin cancer. From the C2 pre-survey onwards, respondents were also asked whether unprotected exposure to the sun in childhood increases the risk of skin cancer, and if so how much (i.e. by a small amount, double, or more than double).

Attitudes to sun protection were measured by reading a number of statements about this issue and asking respondents to rate their level of agreement with these on a Likert scale. Because a small number of these statements were not found to be sufficiently relevant to the campaign objectives in the first two surveys this measure was refined for the C2 pre-survey onwards, and as a result only data relating to attitudes from these latter surveys are presented here. Exploratory factor analysis was conducted with oblique rotation to produce maximally orthogonal factors. Four factors were identified, explaining 49% of the variance of the underlying items. These were labelled: (1) acceptance of parental responsibility for sun protection; (2) placing importance on sun protection; (3) taking a thorough approach to sun protection; and (4) caution towards risks from the sun. Factor scores were calculated by summing the values from each of the attitude statements. In analysis these ordinal scores were transformed into dichotomous variables using a score representing agreement with positive statements concerning sun protection as the cut-off.

<table>
<thead>
<tr>
<th>Pre Survey</th>
<th>Post Survey</th>
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Fig. 1: Evaluation of the Seymour the Snowman sun protection campaign in NSW, 1997–2000.
The primary measures of sun protection behaviours were open-ended questions about actions that respondents had taken for their child or themselves on a recent occasion when they were outdoors on a warm sunny day.

The demographic information collected on respondents included gender, age, educational attainment, household income and post code of residence. The post codes of respondents were used to construct a socioeconomic status variable by applying the Australian Bureau of Statistics index of relative socioeconomic disadvantage of post codes in Australia. This uses data from the 1996 Population Census of Australia about economic resources of households, occupation and education to determine a rating for each Australian post code (a rating of 1000 is average).

**Analysis**

Responses concerning recall, knowledge, attitudes and behaviour were calculated as proportions for each survey. Changes in the prevalence of these variables were assessed for statistical significance using forced entry logistic regression with a 95% confidence interval (CI). In one set of logistic regression models, the C1 pre-survey was treated as the baseline or reference group, and likelihood ratios were calculated to determine the significance of changes in the dependent variables at each subsequent survey. Covariates were gender, age category, location of residence (urban or rural), educational attainment level and socioeconomic status tertile. In another set of models only respondents from the post-campaign surveys were included. Here, the earliest post-campaign survey, which was C1 in most cases and C2 for a select number of variables, was the reference group. The same covariates were included in these models. The purpose of this analysis was to examine whether there was any increase or decline in the likelihood of certain outcomes with each subsequent campaign.

**RESULTS**

**Subjects**

Approximately 800 parents took part in each campaign survey. Because the study population (parents or carers of children <12 years) represented a subset of all households contacted by random digit dialling, and the eligibility of households who did not answer the phone or who refused to take part was not determined, an exact calculation of response rates was not possible. Taking a conservative approach of including all refusals in the denominator for response rate calculation, the rates were: C1 pre-, 50%; C1 post-, 46%; C2 pre-, 50%; C2 post-, 48%; and C3 post-, 40%. This represents the lowest limit of the possible response rates, as a proportion of the refusals would not have been eligible to complete the survey and therefore should not be included in the denominator for response rate calculation. The characteristics of respondents are shown in Table 1. There was no difference in the survey samples in terms of gender (three-quarters female), age (mostly >35 years), regional location (evenly divided between urban and rural locations), and socioeconomic status category (approximately even tertiles in each sample). Educational attainment was the only domain in which the survey samples differed. The C3 post sample had significantly fewer respondents from the lowest educational category, the C1 post and C2 post samples the least from the middle category, and the C1 pre sample the lowest proportion from the highest educational category.

**Campaign awareness**

After each campaign there was a significant increase, compared with the C1 pre-survey (baseline), in the proportion of people who recalled seeing or hearing any information about sun protection for children <12 years through the television, radio or print media (Figure 2). The adjusted odds of information recall at each post-campaign survey compared with baseline were: C1, 1.69 (95% CI = 1.37–2.09); C2, 1.73 (95% CI = 1.40–2.14); and C3, 1.41 (95% CI = 1.14–1.75). Recall of the messages or images used in the campaign followed a similar trend to information exposure (Figure 2). Compared with baseline the adjusted odds of campaign recall were 2.40 (95% CI = 1.95–2.96) after C1, 2.24 (95% CI = 1.82–2.76) after C2, and 2.22 (95% CI = 1.80–2.73) after C3.

**Sun protection knowledge**

At baseline, 85–95% of respondents mentioned that applying sunscreen, using hats or wearing protective clothing were steps that they could take to reduce their children’s risk of getting skin cancer. Table 2 shows that these high levels remained constant in all of the campaign surveys.
Avoiding the sun was the protection measure about which there was the lowest level of knowledge, and this declined compared with baseline at the C1 post-survey [odds ratio (OR) = 0.77; 95% CI = 0.62–0.94], C2 pre-survey (OR = 0.70; 95% CI = 0.57–0.86) and C2 post-survey (OR = 0.71; 95% CI = 0.58–0.87). There was little change in the proportion of respondents who knew that unprotected sun exposure in childhood more than doubles the risk of skin cancer in later life for the three surveys across which this knowledge factor was measured.

### Attitudes to sun protection

Figure 3 shows that the only significant change in attitudes concerning sun protection was the increase in the proportion of respondents between...
the C2 and C3 post-surveys who considered the issue of sun protection to be important (OR = 1.25; 95% CI = 1.02–1.53). Compared with the C2 pre-survey there were marginally non-significant increases in the proportions of subjects at the C2 post-survey who said that they took a thorough approach to sun risks (OR = 1.21; 95% CI = 0.99–1.47) and at the C3 post-survey who placed importance on this issue (OR = 1.21; 95% CI = 0.99–1.49). In all three surveys, nearly all respondents showed an attitude of caution towards risks from the sun.

### Sun protection behaviours

Table 3 shows the reported sun protection behaviours of children and adults at each survey. Compared with baseline there was a decline at the C2 pre-survey in the proportion of parents who reported that they had used sunscreen on their children on the most recent occasion that they were outdoors, but a significant rise in this behaviour at the C3 post-survey (OR = 1.59; 95% CI = 1.24–2.04). The level of sunscreen use by children at this latter survey was also significantly higher than the level at the C2 post-survey.
The evaluation findings indicate that the three sun protection campaigns reached over half of the target audience. It was encouraging that the campaigns were able to cut through to this population in a context of considerable ‘background noise’ created by past awareness-raising programmes and the marketing of sun protection products. The presence of such background noise was supported by the finding that 30% of respondents were able to accurately recall some elements of the campaigns before they commenced. However, the fact that recall rose significantly after each campaign, and dropped to near baseline levels between campaigns, indicated that the media strategies used were reaching their intended audience.

High levels of knowledge about the benefits of sunscreen, clothing and hats at baseline meant there was little room for impact by the campaigns

### Table 3: Use of sunscreen, clothing, hats or shade by children and adults when recently exposed to the sun in the middle of the day

<table>
<thead>
<tr>
<th></th>
<th>Campaign 1 (%)</th>
<th>Campaign 2 (%)</th>
<th>Campaign 3 (%)</th>
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<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Sunscreen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>75.1</td>
<td>76.5</td>
<td>65.5a</td>
</tr>
<tr>
<td>Adults</td>
<td>51.6</td>
<td>54.7</td>
<td>44.3a</td>
</tr>
<tr>
<td>Clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>57.7</td>
<td>67.1a</td>
<td>52.4a</td>
</tr>
<tr>
<td>Adults</td>
<td>27.6</td>
<td>31.8</td>
<td>29.2</td>
</tr>
<tr>
<td>Hats</td>
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<td></td>
<td></td>
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<tr>
<td>Children</td>
<td>28.4</td>
<td>27.0</td>
<td>33.4a</td>
</tr>
<tr>
<td>Adults</td>
<td>20.8</td>
<td>16.7a</td>
<td>20.4</td>
</tr>
<tr>
<td>Shade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>70.6</td>
<td>75.4a</td>
<td>60.2a</td>
</tr>
<tr>
<td>Adults</td>
<td>47.4</td>
<td>49.5</td>
<td>42.5</td>
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*a*Adjusted odds ratio shows a significant difference from campaign 1 pre-survey level.

*b*Adjusted odds ratio shows a significant difference from campaign 1 post-survey level.

(OR = 1.50; 95% CI = 1.17–1.92). Sunscreen use by adults on themselves was reported less frequently but showed similar trends to that of children, declining significantly at the C2 pre-survey, but increasing significantly following C3 (OR = 1.35; 95% CI = 1.10–1.65).

The use of clothing for sun protection by children was higher following each campaign compared with baseline, although this only reached significance at the C1 post-survey (OR = 1.51; 95% CI = 1.23–1.86) and the C3 post-survey (OR = 1.41; 95% CI = 1.14–1.73). As with sunscreen use, adults were less likely to wear clothing for sun protection than children. The frequency of this behaviour among adults increased after each campaign, but compared with baseline only reached significance following C3 (OR = 1.48; 95% CI = 1.19–1.84).

Hat wearing by children did not change following C1, but was significantly higher at both the C2 pre-survey (OR = 1.25; 95% CI = 1.01–1.56) and the C2 post-survey (OR = 1.48; 95% CI = 1.19–1.83) compared with baseline. The frequency of hat wearing by children showed a marked decline at the C3 post-survey, to a level below that of baseline. For adults the only occasion on which hat wearing was higher than at baseline was following C2, although this improvement was not significant. In fact, the frequency of hat wearing among adults was significantly lower than at baseline following both C1 (OR = 0.73; 95% CI = 0.56–0.94) and C3 (OR = 0.77; 95% CI = 0.60–1.00).

### DISCUSSION

The use of shade increased among children after each campaign, with this improvement reaching statistical significance compared with baseline following C1 (OR = 1.33; 95% CI = 1.06–1.67) and C3 (OR = 1.37; 95% CI = 1.09–1.72). Among adults the use of shade rose, but less markedly than for children, following each campaign. The levels after C3 were significantly higher than at baseline (OR = 1.27; 95% CI = 1.04–1.56).

The evaluation findings indicate that the three sun protection campaigns reached over half of the target audience. It was encouraging that the campaigns were able to cut through to this population in a context of considerable ‘background noise’ created by past awareness-raising programmes and the marketing of sun protection products. The presence of such background noise was supported by the finding that 30% of respondents were able to accurately recall some elements of the campaigns before they commenced. However, the fact that recall rose significantly after each campaign, and dropped to near baseline levels between campaigns, indicated that the media strategies used were reaching their intended audience.

High levels of knowledge about the benefits of sunscreen, clothing and hats at baseline meant there was little room for impact by the campaigns
in this area. Studies among adolescents in Australia have shown similarly high levels of knowledge about these factors, and it is thought that the widely used slogan ‘Slip, Slop and Slap’ (slip on a shirt, slop on some sunscreen and slap on a hat) in skin cancer programmes has contributed to this (Lowe et al., 1993). On the other hand, knowledge about avoiding the sun in order to reduce skin cancer risk was shown by substantially fewer respondents and this declined after the baseline survey, only achieving these initial levels again after C3. This may have been because staying out of the sun was not a key message conveyed in the mass media campaigns. An alternative explanation is that parents perceived their knowledge about clothing, sunscreen and hats to be sufficient for their needs, and were not receptive to further information. Similarly, the finding of no change in knowledge of the relative risk of skin cancer due to childhood sun exposure may have been because parents did not regard this information as of concrete benefit to them.

There was little evidence of campaign impacts in the area of sun protection attitudes. It was only the attitude relating to the importance of sun protection that showed significant improvement. This was a positive outcome given that this factor incorporated items concerning whether the effort involved in sun protection is worthwhile and whether very small children are most in need of protection. However, the lack of significant improvement in other important attitudes regarding parental responsibility and taking a thorough approach to sun protection indicates that continued campaigns and health promotion initiatives may be needed to foster such attitudes. It should also be remembered that attitudes not only mediate but also follow behaviours (Wilde, 1993), so that the development of such attitudes will depend in part on the experience that parents are able to gain in using sun protection measures. The finding that the attitude of caution to the risks associated with sun exposure was held by around 95% of parents suggests that there is a good basis of understanding for fostering attitudes that support more specific aspects of sun protection.

The use of sunscreen, protective clothing and shade rose following each campaign, indicating that these behaviours were responsive to this mass media intervention. Given that in all cases, except that of clothing use by children, the increase only reached statistical significance compared with baseline after C3, the results suggest that repeated campaigns may be necessary to achieve and maintain behaviour change. Furthermore, the decline in the frequency in each of these behaviours from the C1 post-survey to C2 pre-survey, often to levels below those of baseline, indicates that campaigns may have a short-term effect, and need to be reinforced to prompt action. Comparison of the frequency of sunscreen, clothing and shade use between the post-campaign surveys did not show a significant increase in impact from one campaign to the next. This is consistent with the findings in physical activity research, which have shown that serial mass media campaigns do not have a cumulative effect (Owen et al., 1995).

Hat wearing by both children and adults stood out as going against the trend shown by the other behaviours, being higher after C2 than baseline but lower after both C1 and C3. It is also noteworthy that this was the least frequent sun protection behaviour, reported at its peak by a little over one-third of children and approximately one-quarter of adults. A previous sun protection campaign for outdoor workers in Australia also reported that this behaviour was resistant to change (Borland et al., 1991) while another campaign did show a significant effect on hat wearing, but this was from a low baseline frequency of 19% to a level of just 29% (Hill et al., 1993). Given that this is a central part of the sun protection measures that have been widely promoted in Australia it presents a concern, and indicates that the obstacles relating to hat wearing will need to be more closely examined and addressed in future campaigns.

A consistent finding across all behaviours was their lower frequency among adults than children. On the positive side, this at least indicates that there is recognition of the importance of taking sun protection measures for children. On the negative side, it suggests that parents are neglecting the skin cancer risks that they face, and may be neglecting the important function that they have as a role model for their children.

The limitations of the before and after study design used to obtain these findings should be recognized. As is often the case in the evaluation of media and community-wide interventions, this approach was used because of the financial and practical difficulties involved in recruiting unexposed control samples. While the use of repeated pre- and post-campaign surveys strengthens the basis for observing associations between campaign implementation and various impacts, the absence of a control sample means that the contribution
of secular trends to the results cannot be measured. A cohort design is often useful for measuring changes over time but was not used here because of the potential for the self-report measures to have been biased by pre-test sensitization. The available response rate data in this study also raises a question about the generalizability of these findings. However, the similarity between each survey sample, together with the use of adjusted analysis, reduced the potential for confounding. The use of self-report was another necessary limitation because the size and dispersion of the sample did not allow the use of objective, observational measures that have been used elsewhere (Foot et al., 1993).

In light of the strong history of skin cancer control activities in Australia, and the high levels of knowledge about this issue in the population, the role of the campaign in the terms of Flora et al.’s typology of media interventions could be called supportive and supplementary (Flora et al., 1989). That is, rather than introducing new ideas, the function of the campaigns was to reinforce previous information and to complement the range of initiatives being carried out at the community level. The latter role is important to acknowledge, given the proliferation of policy, environmental change and educational strategies that were implemented in parallel with this mass media campaign in NSW. While data is not available to quantify the level of this activity, in the area of smoking cessation it has been reported that the combination of community level interventions with mass media strategies significantly increases the impact of the latter (Flay, 1987).

While these evaluation results were positive in some areas of sun protection behaviour, it is apparent that in a country where skin cancer presents such an enormous public health problem, there is still considerable progress to be made. The use of hats and to a lesser extent shade, the promotion of attitudes of parental responsibility and thoroughness in relation to child sun protection, and greater attention to the protective measures that adults take for themselves, stand out as priorities for future sun protection initiatives in this context. The finding that information exposure and campaign recall rose to approximately similar levels following each campaign, dropping down to baseline levels or slightly below these between campaigns, indicates that these interventions do not have a sustained or cumulative effect. This suggests the need for continued strategies to maintain sun protection on the population’s agenda, and possibly, the development of alternative approaches that might have a more lasting impact. Policy, environmental and community level initiatives have an important role to play in this ongoing endeavour.

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REFERENCES


