

Resource provision and environmental change for the prevention of skin cancer:

Systematic review of qualitative evidence from high-income countries

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Abstract

This paper presents the findings of a systematic review of qualitative studies from high-income (OECD) countries relating to sun protection and skin cancer, with a focus on barriers and facilitators for the following interventions: resource provision; environmental change; and multi-component interventions. Twenty-three study reports were included in the review. Data were analysed using a thematic analysis methodology with the Health Belief Model as a framework. The risk and potential severity of skin cancer are not seen as important concerns, and tanning which is not deliberate is seen as less dangerous. There are a number of social and practical barriers to the use of sun protection resources, including cost, inconvenience, and social norms. There are important differences between age groups and between men and women in attitudes.

Keywords: skin cancer, prevention; systematic review; qualitative research

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INTRODUCTION

Exposure to ultraviolet (UV) light, either sunlight or artificial radiation from tanning beds, is the primary cause of skin cancer, both melanoma and non-melanoma. The incidence of melanoma has risen rapidly in many countries over the last few decades (Purdue et al. 2008; Linos et al. 2009). Non-melanoma skin cancers are also on the increase (Rogers et al. 2010). Skin cancer can be prevented through reducing exposure to UV light through measures such as avoiding excessive sunlight and using protective clothing or sunscreen. However, quantitative observational studies show that adherence to sun protection recommendations in the general population are low (Kasparian et al. 2009). Health promotion initiatives to increase such sun protection behaviours may encounter a number of barriers and facilitators in the form of the public's attitudes and beliefs. Hence, investigating people's beliefs about skin cancer, and the factors which influence their behaviours relating to UV exposure, may be of value in evaluating and implementing interventions.

This report presents the findings of a systematic review of qualitative evidence relating to skin cancer prevention. The primary research question for the review was: What factors help or hinder the provision or use of sun protection resources, environmental change, and multi-component interventions, to prevent the first occurrence of skin cancer attributable to UV exposure?

The review was commissioned by the UK National Institute for Health and Clinical Excellence. It forms part of a broader programme of work which was structured as follows. Phase 1 considered education and information provision interventions, and included a review of effectiveness and cost-effectiveness (Malottki et al. 2009) and a review of qualitative evidence (Garside et al. 2009; Garside et al. 2010). Phase 2 considered resource provision and environmental change interventions, and similarly included a review of effectiveness and cost-effectiveness (McDaid et al. 2010) and a review of qualitative evidence (Lorenc et al. 2010, and the present paper). The studies included in our review partly overlap with those included in the phase 1 qualitative review (nine of 23 study reports). However, the majority of the studies do not appear in the phase 1 review, and the synthesis presented here is substantially new.

METHODS

Identification of Studies

The following database sources were searched from 1990 to December 2009:

- ASSIA
- Campbell Collaboration Library of Systematic Reviews
- Centre for Reviews and Dissemination databases (including DARE and HTA)
- CINAHL
- Cochrane Library (including CENTRAL)
- Embase
- ERIC
- HMIC
- Medline
- PsycInfo
- Social Policy and Practice

The search strategy used for Medline can be found in Appendix 1. The following further search methods were also used:

- manual searching of 17 websites of relevant organisations;
- contact with the authors of the linked review of effectiveness and cost-effectiveness (McDaid et al. 2010);
- scanning of citation lists of included studies obtained through database searching;
- 'forward' citation chasing on these studies using ISI Web of Knowledge; and
- scanning lists of included studies from all systematic reviews which met the inclusion criteria (excluding the phase 1 review (Garside et al. 2009)).

Selection of Studies

All titles and abstracts were screened by two reviewers independently and any differences resolved by discussion and reference to a third reviewer if necessary. The full texts of records whose abstracts met the

inclusion criteria, or for which it was unclear whether they met the criteria, were retrieved. The full text papers were then re-screened by two reviewers independently.

The inclusion criteria were:

1. Does the study address the primary prevention of skin cancer due to UV exposure, or views relating to skin cancer, sunbathing or tanning?
2. Does the study present qualitative research (e.g. surveys (with open-ended questions), interviews, or ethnographic or action research)?
3. Was the study published in 1990 or later?
4. Is the study published in English?
5. Does the study present (i) views relating to environmental change; (ii) views relating to resource provision; (iii) views relating to multi-method interventions including (i) and/or (ii); (iv) views on the potential barriers or facilitators relating to skin cancer prevention activities?
6. Was the study conducted in a country which is a current member of the OECD?

Criteria 3 and 4 were adopted for pragmatic reasons of availability of time and resources, and criterion 6 mainly to ensure the applicability of the data.

Quality Assessment

Study quality was assessed using a standardised tool (National Institute for Health and Clinical Excellence 2009, Appendix H). This tool is broadly similar to other widely used tools for the quality assessment of qualitative studies (e.g. Hawker et al. 2002, Appendix D; CASP 2006). It covers the appropriateness of the study methodology, the reliability of data collection and analysis, the ‘richness’ of the data, the description of the context, the clarity of the findings and conclusions, and the reporting of ethics. On the basis of these questions, each study was assigned an overall quality rating: high (++), medium (+) or low (–). Lower-quality studies were not excluded from the review, nor were they given less weight in the synthesis; this is because the validity of formal quality assessment measures for qualitative research remain controversial (Dixon-Woods et al. 2004), and because excluding lower-quality studies would have implied the loss of data which made a valuable contribution to the synthesis.

Both quality assessment and data extraction were conducted for a randomly selected sample (N=3) of studies by two reviewers independently; subsequently they were conducted by one reviewer and then checked in

detail by a second reviewer. These checks were carried out primarily to ensure consistency of interpretation within the research team.

Data Extraction and Synthesis

Data were extracted from the studies using a standardised tool (National Institute for Health and Clinical Excellence 2009, Appendix K) which covers population and sampling methods, theoretical perspective, data collection, data analysis and study findings. Data were synthesized using a framework based on the Health Belief Model (HBM), with some alterations. The HBM was chosen because it provides a reasonably comprehensive framework for understanding perceptions and attitudes, while also helping to make the analysis more relevant to health promotion policy and practice. In addition, the HBM was used as a framework by three of the primary studies included in the review, showing the feasibility of such an analysis (Gillespie et al. 1993; Gerbert et al. 1996; Glanz et al. 1999), and is generally supported by the quantitative evidence base on sun protection behaviours (Kasparian et al. 2009). Our framework included the following categories:

- perceived susceptibility to (risk of) skin cancer;
- perceived severity of consequences of sun exposure;
- perceived benefits from sun protection;
- perceived barriers to sun protection behaviour;
- cues to action which may trigger preventive activity; and
- differences between subgroups in the population (gender, age, ethnicity, and occupation or socio-economic status).

The findings data extracted from the studies were coded by two reviewers according to the thematic headings of the model. Within the headings, subheadings were developed inductively where appropriate. The findings under each code were then drawn together in a narrative synthesising the study findings.

RESULTS

A total of 1,986 unique references were screened for inclusion. A total of 23 papers, representing 22 distinct studies, were included in the review. The flow of literature through the review is illustrated in Figure 1.

[INSERT FIGURE 1 ABOUT HERE]

Table 1 presents the aims and contexts of the studies and the outcomes of quality assessment. All the studies used some form of interview or focus group methodology to collect qualitative data. Studies were conducted in the USA (N=7), UK (N=6), Australia, Canada, New Zealand (each N=3) and Sweden (N=1). A range of populations were included in the studies.

The findings are presented below according to the synthesis framework (see above).

[INSERT TABLE 1 ABOUT HERE]

Perceived Susceptibility to Skin Cancer

In general, perceived susceptibility was found to be low. Children and young people, especially, saw skin cancer as a problem for older people and the risk, if any, to be far in the future (Gillespie et al. 1993; Curtis and Pollock 2009; Cancer Research UK n.d.-a); some adults also expressed such views (Gerbert et al. 1996). “You don’t think about it happening ... we are young, and the possibility is so far in the future” (participant, 12-13 years old, Curtis and Pollock 2009). Participants saw skin cancer as less of a concern than other health issues (Curtis and Pollock 2009).

Where participants were aware of the risks of UV exposure, they tended to avoid thinking about them, or adopted optimistic framings which minimised risks (Murray and Turner 2004; Calder and Aitken 2008; Cancer Research UK n.d.-b). “Well I mean, the obvious risk is skin cancer but I tend not to think about it, you just seem to put it to the back of your mind and hope that you won’t get it” (participant, Murray and Turner 2004).

Several factors were seen to affect risk. Children were seen to be at more risk than adults because of their “more delicate skin” (Cancer Research UK n.d.-b). Many participants expressed the belief that sun exposure could decrease the risk of sun damage or cancer by increasing “resistance” (Parrott et al. 1996; Glanz et al. 1999; Cancer Research UK n.d.-b).

Perceived Severity of Consequences of Sun Exposure

Two consequences of sun exposure were identified in the studies: skin cancer and the effects on appearance, such as ageing of the skin. Skin cancer was believed by most participants to not be a serious threat (Gillespie et

al. 1993; Gerbert et al. 1996; Parrott et al. 1996; Glanz et al. 1999; Murray and Turner 2004; Calder and Aitken 2008; Paul et al. 2008). In particular, they argued that that skin cancers are easily treatable (Glanz et al. 1999; Calder and Aitken 2008; Paul et al. 2008) and would not affect their ability to work (Parrott et al. 1996). “I think I’ll get cancer, I know I’ll get cancer, because I don’t care about protection now. I won’t die of cancer – I’ll just have a few things taken out” (female, 16-17 years, participant, Paul et al. 2008).

Skin ageing was perceived by some participants to be as serious a consequence of sun exposure as the risk of cancer (Gerbert et al. 1996; Murray and Turner 2004). Concern about skin ageing was more prevalent among female than male participants (Lupton and Gaffney 1996; Abroms et al. 2003; Murray and Turner 2004; Paul et al. 2008).

Perceived Benefits of Sun Protection

Several perceived benefits of sun protection were mentioned, including: avoiding cancer (Abroms et al. 2003; Paul et al. 2008; Hay et al. 2009; Hurd Clarke and Korotchenko 2009); avoiding visible skin ageing (Abroms et al. 2003; Paul et al. 2008; Hurd Clarke and Korotchenko 2009); and avoiding discomfort or sunburn (Gillespie et al. 1993; Abroms et al. 2003; Paul et al. 2008).

Perceived Barriers to Using Sun Protection

Positive perceptions of a tanned appearance

A tanned appearance was seen as attractive or aesthetically pleasing by many participants (Gillespie et al. 1993; Gerbert et al. 1996; Lupton and Gaffney 1996; Grey 1998; Reeder et al. 2000; Shoveller et al. 2003; Murray and Turner 2004; Young et al. 2005; Calder and Aitken 2008; Paul et al. 2008; Curtis and Pollock 2009; Hurd Clarke and Korotchenko 2009). Conversely, untanned white skin was viewed as unattractive, and described with terms such as “ugly” and “pasty” (Lupton and Gaffney 1996; Curtis and Pollock 2009; Hurd Clarke and Korotchenko 2009). However, a very deep tan was not universally regarded as desirable (Lupton and Gaffney 1996; Shoveller et al. 2003; Hurd Clarke and Korotchenko 2009).

More specifically, a tanned appearance was frequently described as “healthy” (Gerbert et al. 1996; Lupton and Gaffney 1996; Grey 1998; Shoveller et al. 2003; Murray and Turner 2004; Young et al. 2005;

Calder and Aitken 2008; Curtis and Pollock 2009; Hurd Clarke and Korotchenko 2009). In some cases, participants saw a tan as indicative of a healthy lifestyle involving outdoor physical activity, and untanned skin as indicative of a less healthy lifestyle.

I have got a friend and she is really pale, and it really describes the way she lives. Because I mean, she doesn't go bike riding or to the beach or anything, that's why she is not tanned, and you can tell who's sport and who goes out a lot and who just stays in. (female, participant, Lupton and Gaffney 1996)

Some participants also reported feeling more confident or having more self-esteem with a tan (Gerbert et al. 1996; Murray and Turner 2004), or saw a tan as representing a change of personality or "a different side" of people (female, 14-15 years, participant, Curtis and Pollock 2009).

Perceived benefits of sun exposure

Some participants mentioned that UV exposure increased vitamin D (Gerbert et al. 1996; Murray and Turner 2004; Hurd Clarke and Korotchenko 2009). More generally, being outdoors was reported to "feel healthier" than being indoors (Gillespie et al. 1993; Gerbert et al. 1996; Bergenmar and Brandberg 2001). For younger children, this is linked to being free to run and play (Gillespie et al. 1993). A related point is that being outdoors in sunny weather improves people's mood (Calder and Aitken 2008). "It's pleasant and feels healthy to be outdoors in the sun and the breeze" (participant, Bergenmar and Brandberg 2001).

Routes to tanning

Participants distinguished deliberate from incidental tanning, and expressed different attitudes to these different routes to tanning. Participants often implied that deliberate tanning was more dangerous, and called more for protection, than getting a tan incidentally by being outdoors (Lupton and Gaffney 1996; Bergenmar and Brandberg 2001; Shoveller et al. 2003). "Planning to sunbathe gives me a guilty conscience. I don't consider myself one who would sunbathe on a pier; I lie on a pier reading a book. I realize there is not much difference" (participant, Bergenmar and Brandberg 2001).

The importance of the distinction may be linked to the idea that outdoor activities are healthy in themselves, in contrast to deliberate sunbathing (Bergenmar and Brandberg 2001). This link was particularly

expressed by young people (Shoveller et al. 2003). “I don’t really see that sun tanning can really damage you ... [if] you get it from an outdoor activity” (male, 13 years, participant, Shoveller et al. 2003).

Some male participants felt that deliberately trying to become tanned was unmasculine, but getting a tan as an incidental result of engaging in outdoor activities, particularly sports, was acceptable (Lupton and Gaffney 1996).

Several participants distinguished sun exposure from sunbed use, usually seeing the latter as more dangerous, often because it is “unnatural” (Shoveller et al. 2003; Murray and Turner 2004; Hurd Clarke and Korotchenko 2009).

Social barriers to sun protection

Protective clothing was considered unfashionable or unattractive, particularly among children and young people (Gillespie et al. 1993; Lupton and Gaffney 1996; Glanz et al. 1999; Shoveller et al. 2003; Calder and Aitken 2008; Paul et al. 2008).

Several participants noted that people around them generally did not use sun protection, or that there was little social support for using it (Parrott et al. 1996; Glanz et al. 1999; Abroms et al. 2003). Sunscreen was seen as linked to particular contexts, especially the beach or holidays, with the implication that protection was less likely to be used in other contexts (Gillespie et al. 1993; Parrott et al. 1996; Glanz et al. 1999; Abroms et al. 2003; Cancer Research UK n.d.-b). Sunscreen use was seen as unmasculine by some young adult men; the idea of another man applying sunscreen was particularly rejected (Abroms et al. 2003). In general, sunscreen was much more frequently mentioned by participants than other forms of sun protection.

Some participants saw social norms and official messages about sun protection as relevant only to young children; adolescents expressed this view in regard to their younger siblings (Paul et al. 2008) and parents in regard to their children (Grey 1998). “I put cream on my son every half hour, but for me I put it on once and then I think that’s OK” (female, 19-24 years, participant, Grey 1998).

Practical barriers to sun protection

Several practical barriers to the use of sun protection were mentioned. Participants found it inconvenient to remember to carry sunscreen (Gillespie et al. 1993; Abroms et al. 2003) or protective clothing (Paul et al. 2008). The ‘messiness’ involved in applying sunscreen was also mentioned in several studies (Gerbert et al. 1996; Parrott et al. 1996; Reeder et al. 2000; Abroms et al. 2003; Curtis and Pollock 2009; Cancer Research UK n.d.-b). Some participants found that protective clothing was uncomfortable (Gillespie et al. 1993; Parrott et al. 1996; Glanz et al. 1999; Paul et al. 2008) and got in the way of activities (Parrott et al. 1996; Glanz et al. 1999; Paul et al. 2008). Cost was also mentioned as a barrier, particularly of sunscreen (Glanz et al. 1999; Reeder et al. 2000; Abroms et al. 2003; Paul et al. 2008).

Institutional barriers

Staff in schools identified several potential barriers to implementing interventions to reduce students’ sun exposure, such as re-scheduling activities or providing shade structures. They were concerned about the cost and the time involved for staff, and saw their options for implementing interventions as limited; they also saw themselves as “bombarded” with too many policies and initiatives about different issues (Geller et al. 2008). Some staff did not feel that sun protection should be a high priority for schools, for example, because it distracted from the core task of teaching (Collins et al. 2006).

Cues to Action

A range of factors may act as cues to adopt sun protection behaviours. Decisions about sun protection depend on weather conditions (Gerbert et al. 1996; Curtis and Pollock 2009; Cancer Research UK n.d.-b) and on individual exposure, with some participants more likely to use protection when they notice that they are already beginning to burn (Grey 1998; Bergenmar and Brandberg 2001).

Parents, particularly mothers, are an important source of influence, especially for children and young people (Gillespie et al. 1993; Glanz et al. 1999; Abroms et al. 2003; Shoveller et al. 2003; Young et al. 2005; Paul et al. 2008; Hurd Clarke and Korotchenko 2009). “When I’m packing she’ll [mother] make sure I’ve got the sunscreen in the bag and then when I’m ready to go, she’ll make me put it on again and put zinc on my lips” (male, participant, Paul et al. 2008). Teachers, lifeguards and coaches were also mentioned as sources of encouragement for sun protection (Gillespie et al. 1993; Glanz et al. 1999; Paul et al. 2008).

However, parental encouragement is not always effective. “[My mom says,] ‘You’re going to die [from working as a lifeguard without sunscreen]. You’re going to get skin cancer.’ All right, mom. Have a good day. I’m going to work. Leave me alone” (male, participant, Abrams et al. 2003).

Sources of encouragement differ between age groups, with older children and young people more influenced by their peers, and younger children by authority figures such as teachers (Gillespie et al. 1993; Lupton and Gaffney 1996; Shoveller et al. 2003; Young et al. 2005; Cancer Research UK n.d.-c). This suggests that older young people are less likely to be reached by health messages, particularly where these are perceived as simplistic or authoritarian (Lupton and Gaffney 1996). On the other hand, some young people felt that they had become more open to health messages with age. “When you are at that age at primary, sometimes you like to do the opposite to what you are told. That’s how it is. But as you get older, you reason with yourself and realize that it’s stupid” (male, 16-17 years, participant, Paul et al. 2008).

The effects of media messages were also mentioned by several participants. However, these were generally perceived to dissuade people from using sun protection by promoting the attractiveness of a tan (Gillespie et al. 1993; Gerbert et al. 1996; Abrams et al. 2003). Messages promoting sun protection were seen to be of limited effectiveness. “When there was first the big scare about the hole on the ozone layer, about how we were all going to get skin cancer... for a while I was wearing sunscreen... But that lasted maybe three weeks” (participant, Gerbert et al. 1996).

Policies in schools and leisure facilities may also encourage sun protection behaviour. Collins and colleagues’ study of primary schools in New Zealand found that most schools had school-wide policies, often as part of a ‘whole-school’ health promotion approach, including: physical shade structures or tree planting; rules such as ‘no hat, no play’; free sunscreen provision; and rescheduling of outdoor activities (Collins et al. 2006). Generally, school staff were positively disposed to these policies and perceived them as being effectively implemented. Escoffery and colleagues conducted a process evaluation of the ‘Pool Cool’ intervention in swimming pools in the USA, which included providing sunscreen pumps and shade structures (Escoffery et al. 2008). They also found that the intervention was implemented successfully and uptake was high.

However, some other studies of staff in schools (Geller et al. 2008) and leisure facilities (Glanz et al. 1999) found that they were ambivalent about their role in promoting sun protection and sometimes not confident about promoting change, although most were willing to participate in sun protection policies.

Subgroup Differences

Gender

The studies show several differences in men's and women's attitudes. In two studies, men were found to be less likely than women to deliberately sunbathe to tan, but also less likely to use sun protection (Abroms et al. 2003; Cancer Research UK n.d.-c). These differences appear to be linked by the perception that actions motivated by concern with one's appearance are unmasculine. This applies both to deliberate sunbathing (Lupton and Gaffney 1996) and sunbed use (Calder and Aitken 2008; Cancer Research UK n.d.-b), but also to the use of sun protection such as sunscreen (Abroms et al. 2003). Concern about appearance was more readily expressed by women than men in several studies (Lupton and Gaffney 1996; Abroms et al. 2003; Murray and Turner 2004; Paul et al. 2008). These differences between men's and women's attitudes are particularly marked in older teenagers and young adults, but in a few cases are apparent even at age 12 to 14 (Paul et al. 2008).

In addition, women, especially mothers, tend to take the lead role in promoting sun protection behaviours within the family, particularly for children but also for other adults (Abroms et al. 2003; Paul et al. 2008; Hay et al. 2009).

Age

There are consistent differences between older children and young people, and younger children. Older young people are often engaged in a process of gaining independence which may lead to the rejection of simplistic messages from adults and authority figures (Lupton and Gaffney 1996; Shoveller et al. 2003; Young et al. 2005; Cancer Research UK n.d.-c). They may see sun protection as a matter for younger children (Paul et al. 2008).

Parents of young children appear to be more receptive than the general population to sun protection messages (Glanz et al. 1999; Reeder et al. 2000; Cancer Research UK n.d.-c; Cancer Research UK n.d.-b). However, some data suggest that parental concern relating to young children's sun exposure may not extend to their own sun exposure, or to that of older children (Grey 1998; Paul et al. 2008; Cancer Research UK n.d.-b).

Ethnicity

Very few data were located on differences between ethnic groups.

Socio-economic status and occupation

Few data were located on SES as such, although one study found that people from higher-SES groups were more aware of long-term health risks from sun exposure than those from lower-SES groups (Cancer Research UK n.d.-c).

One occupational group of particular concern is outdoor workers, who were the focus of two included studies (Parrott et al. 1996; Cancer Research UK n.d.-b). Both these studies found a low perceived severity of and susceptibility to skin cancer. Parrott and colleagues' study of farmers in the USA also found that they had limited access to resources for preventing skin cancer, and that inconvenience was a more salient barrier than cost (Parrott et al. 1996). The other study, of outdoor workers in the UK (Cancer Research UK n.d.-b), found that some participants felt that sun protection was not a priority for their employers. These studies indicate potentially serious barriers to adopting sun protection behaviours among outdoor workers.

Discussion

The findings of this review are consistent with what is known from the quantitative literature on attitudes and behaviours, which shows that higher levels of sun protection behaviour are associated with higher perceived risk and severity of skin cancer and greater perceived benefits of sun protection (Kasparian et al. 2009). The qualitative evidence helps to illustrate some of the pathways which link attitudes to broader social constructs and meanings, and thus influence sun protection behaviours.

The first relevant point here is that sun protection is not seen as salient or relevant in most contexts. To the extent that the risk of skin cancer was a concern for study participants, it was usually associated with beaches and holidays rather than other settings, with deliberate tanning (sunbathing and sunbed use) rather than incidental sun exposure, and with young children rather than other age groups. In some climates, such as the UK, where a substantial proportion of UV exposure comes from holidays and sunbed use, this association may be a reasonable reflection of the real risk; however, our data suggest these perceptions are also current in locations with sunnier climates, such as Australia. Moreover, these findings indicate the importance of the cultural meanings of sunbathing and tanning in determining perceptions of skin cancer risk. This may account

for some of the challenges in reaching groups at risk because of their occupation, since sun exposure in a work context is unlikely to be seen as risky.

This point links to a further set of issues around appearance and health. Our findings help to explain the perception of a tanned appearance as 'healthy' by linking it to the perception (which, again, is found in both higher-risk locations in Australia or the southern USA, and lower-risk locations in northern Europe) that being outdoors, and particularly engaging in a physically active lifestyle, are 'healthy.' Thus, the risks involved in incidental sun exposure they are outweighed by these perceptions of being outdoors as healthy. This suggests that concerns about a potential conflict between the prevention of skin cancer and the promotion of physical activity are well-founded (Fielding and Teutsch 2010).

Our findings on gender help to illuminate these links further. Quantitative studies have found that men report spending more time in the sun than women, lower rates of sun protection behaviour, and more barriers to such behaviours (Kasparian et al. 2009). Our findings bear this out, with women consistently reporting greater concern about skin cancer and sun protection than men. In addition, they may help to explain the apparent paradox in the quantitative literature that women report greater concern about the consequences of UV exposure, but higher rates of deliberate sunbathing and sunbed use (Kasparian et al. 2009). The qualitative literature suggests that concern with appearance in general is coded as feminine - in line with a pervasive gender norm which has been summarized as 'men act, women appear' (Berger 1972) - such that men are reluctant to be seen to deliberately tan, or to use sun protection where this is seen as primarily motivated by a concern for appearance. A tanned appearance is still valued by many men, but social norms of masculinity indicate that it should be gained as an incidental consequence of outdoor activities such as sports, rather than by deliberate tanning. These findings indicate that men are likely to be hard to reach for skin cancer prevention initiatives, particularly where sun protection messages emphasize appearance-related concerns.¹

This review has a number of limitations. Although the review used a full systematic review methodology, it may not be absolutely comprehensive. The included studies cover a wide range of diverse settings and contexts, and there may be challenges in generalizing across them; perceptions may differ between locations because of differences in climate, but also because of differing national policy contexts and histories. Finally, the thematic analysis methodology may under-estimate the complexity and diversity of individuals' views by focusing attention on themes which are common to several individuals. These limitations aside, this

¹ It is unclear to what extent outcomes of appearance-focused interventions differ by gender. Of the studies reviewed by Dodd and Forshaw (2010), none present a subgroup analysis of outcomes by gender (the samples in most studies were predominantly female).

review provides an overview of what is known from qualitative research about the public's attitudes to skin cancer and sun protection, and indicates a number of potentially important barriers and facilitators of successful skin cancer prevention interventions.

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Figure 1. Flow of literature through the review

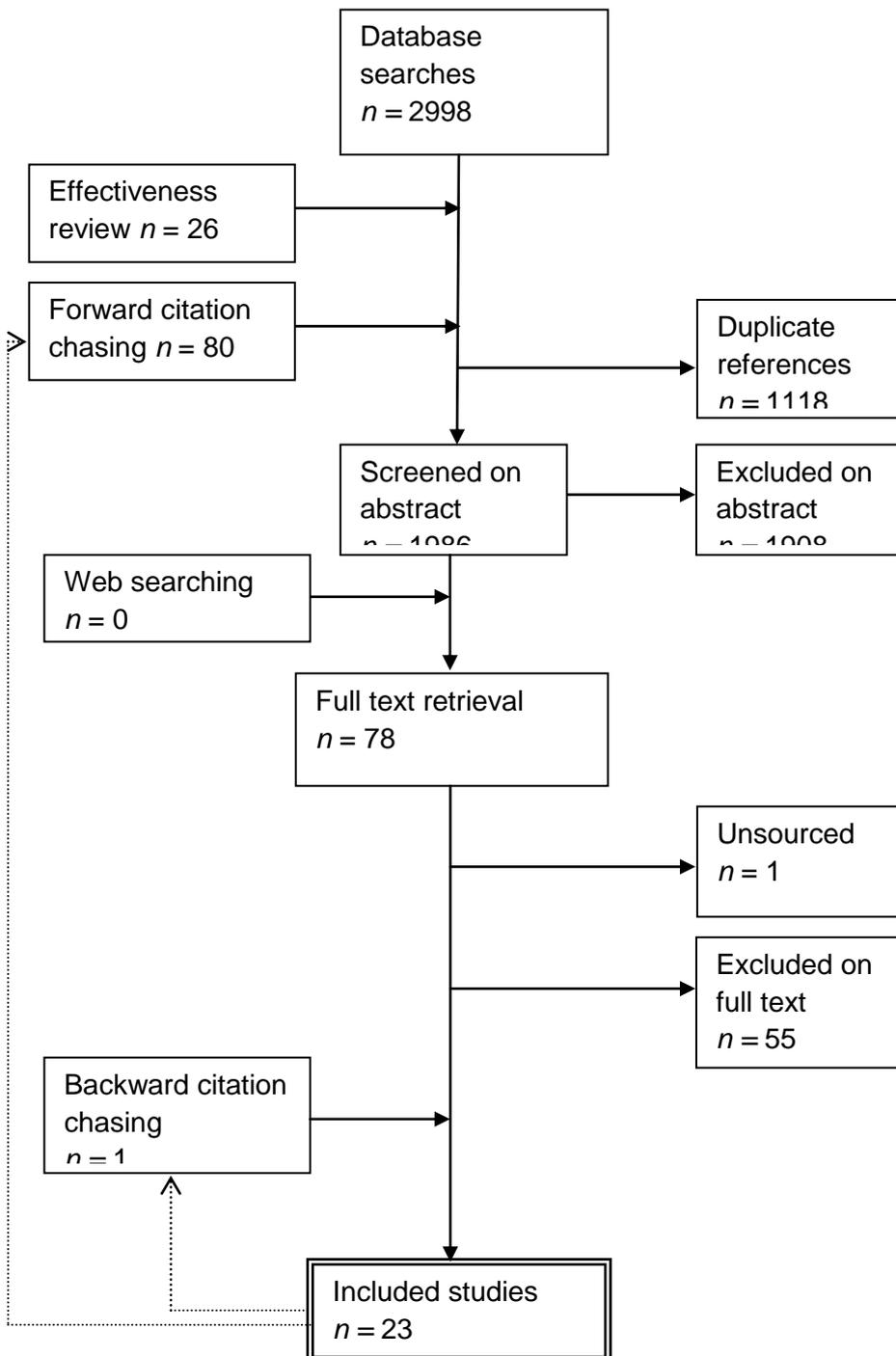


Table 1

Characteristics of the included studies

Reference	Aim	Method and population	Location	Linked to intervention programme?	QA score
Abroms, et al., 2003	To understand beliefs underlying sunscreen use, and differences between men and women in these beliefs	Focus groups; men and women; ages 18-25 years; light or medium skin-tone	Baltimore, Orlando, Denver, USA	No	+
Bergenmar & Brandberg, 2001	To investigate attitudes to sun-related behaviour and sun protection among young people at risk of melanoma	Interviews with non-melanoma patients from pigmented lesion clinic; ages 18-30 years; ethnicity NS	Stockholm-Gotland, Sweden	No	++
Calder & Aitken, 2008	To understand influences on UV risk behaviours and barriers to adopting protective behaviours	Focus groups; ages 18-20 years; ethnicity NS	New Zealand	No	++
Collins, et al., 2006	To assess how primary schools respond to public health messages regarding sun protection	Interviews with principals, associate principals and teachers from schools in low- and high-socioeconomic-status (SES) areas; ages NS; ethnicity NS	Auckland, New Zealand	School-based programmes (evaluation)	-
Cancer Research UK, n.d.-a (<i>SunSmart</i>)	To identify motivations for tanning and factors encouraging safer behaviour	Focus groups (ages 12-24 years) and in-depth interviews (ages 18 years and younger); ethnicity NS	UK	SunSmart campaign (formative)	-

Reference	Aim	Method and population	Location	Linked to intervention programme?	QA score
Cancer Research UK, n.d.-b (<i>Outdoor workers</i>)	To investigate men's attitudes towards the sun, sun protection and skin cancer, with a focus on outdoor workers	Focus groups, online interviews, in-depth interviews; men; ages 20-50 years; ethnicity NS	UK	No	-
Cancer Research UK, n.d.-c (<i>Sunburn</i>)	To assess knowledge, attitudes and understanding of sunburn and related risks among adults and young people	Focus groups; adults ages 19-30 years, young people ages 13-18 years; most fair skin tone	Leeds, Manchester, Bristol, North London, Sunbury, UK	No	-
Curtis & Pollock, 2009	To explore influences on young women's sun exposure behaviours	Focus groups; young women ages 12-15 years; ethnicity NS	Nottinghamshire, UK	No	-
Escoffery, et al., 2008	To carry out a process evaluation of the Pool Cool Diffusion Trial	Site visits; observations; interviews with leisure facility staff and patrons; ages NS; ethnicity NS	USA	Pool Cool (evaluation)	++
Geller, et al., 2008	To investigate sun protection policies in elementary schools with reference to CDC guidelines	Interviews with elementary school superintendents, principals, teachers, school nurses, parent-teacher organisation presidents and chairs; most White ethnicity	Massachusetts, USA	No	++
Gerbert et al. 1996	To assess people's attitudes and beliefs about skin cancer	Focus group; ages early 20s to mid-60s; 'Caucasian' ethnicity	California, USA	No	++

Reference	Aim	Method and population	Location	Linked to intervention programme?	QA score
Gillespie, et al., 1993	To conduct formative research for a school-based sun protection initiative	Focus group with students in primary and secondary schools; ages 8-16 years; ethnicity NS	Australia	School-based program (formative)	-
Glanz, et al., 1999	To investigate children's, parents' and caregivers' knowledge and attitudes about skin cancer and sun protection, and their views on feasibility of health promotion strategies.	Focus group and interviews with children, parents and recreation staff; children age 6-8 years; ethnicity (children) approx. 1/3 White, 1/2 fair-skinned Asian/ mixed, 1/5 dark-skinned Asian/mixed, Filipino, Native Hawaiian	Hawaii, USA	Sun Smart (formative)	++
Grey, 2008	To develop and test a Sun Safe Code	Individual and group interviews; ages 16-54 years; fair to olive skin tones	UK	Sun Safe Code (formative)	-
Hay, et al., 2009	To examine communication and protective behaviours in families after melanoma diagnosis	Semi-structured interviews with melanoma patients and their adult children; age >18; ethnicity 'Caucasian'	USA	No	++
Hurd Clarke & Korotchenko, 2009	To examine older women's experiences and perceptions of sunbathing and tanning	Semi-structured interviews; female; ages 70-95; mostly fair-skinned	Western Canada	No	+

Reference	Aim	Method and population	Location	Linked to intervention programme?	QA score
Lupton & Gaffney, 1996	To identify discourses and practices about sun protection and tanning among young people	Focus groups with secondary school students; ages 11-16; "English speaking backgrounds"	Australia	Me No Fry (evaluation)	++
Murray & Turner, 2004	To explore reasons for sunbed use	Interviews with adult sunbed users; ages 18-32; ethnicity NS	Merseyside, UK	No	+
Parrott, et al., 1996	To assess determinants of farmers' sun protection behaviours	Field observation; in-depth interviews with farmers, public health nurses and other stakeholders; average age 50 years; White ethnicity (farmers)	Georgia, USA	Georgia's Harvesting Healthy Habits (formative)	+
Paul, et al., 2008	To explore adolescents' sun protection behaviours and differences by age and gender	Focus groups; ages 12-17 years; fair to medium skin tone	New South Wales, Australia	No	++
Reeder, et al., 2000	To investigate parents' attitudes and practices concerning sun protection for young children	Focus groups with parents; ages 35-40 years; ethnicity NS	New Zealand	No	+
Shoveller, et al., 2003	To describe how adolescents make decisions about sunbathing during transition from childhood to adolescence	Interviews with adolescents (ages 12-16 years) and parents (ages 34-50 years); ethnicity NS	Canada	No	++

Reference	Aim	Method and population	Location	Linked to intervention programme?	QA score
Young, et al., 2005 ²	To explore sun-protection projects in families with adolescents	Same as Shoveller et al. 2003	Canada	No	++

Note. NS = not stated.

² Shoveller et al. (2003) and Young et al. (2005) are linked studies (i.e. they present data from the same study). However, the data presented in the two papers are largely distinct and the two were treated separately for the purposes of data extraction.

Appendix 1. Medline search strategy

1. skin cancer.mp
2. (skin and (neoplasm\$ or cancer\$ or carcinoma\$ or adenocarcinom\$ or tumour\$ or tumor\$ or malignan\$)).mp
3. exp skin neoplasms/
4. non melanoma.mp
5. malignant melanoma.mp
6. exp melanoma/
7. exp carcinoma, basal cell/
8. or/1-7
9. sun\$.mp
10. sunburn/
11. tan\$.mp
12. infrared rays/ or infrared\$.mp
13. (solar\$ or damage or ultra violet\$).mp
14. or/9-13
15. prevent\$.mp
16. exp primary prevent/
17. health education\$.mp or exp health education/
18. health promotion\$.mp or exp health promotion/
19. (protect\$ or precaution\$ or reduc\$ or natural\$ or protection or seeking shade or age).mp
20. exp sunscreens agents/ or sun screening agents.mp
21. life style/ or (lifestyle\$ or life-style\$ or life style\$).mp
22. health/
23. or/15-22
24. (built environment\$ or structural chang\$ or physical chang\$ or shade or purpose built or sun trap\$ or architect\$ or consult\$ or design or construction or surrounding\$ or shelter or seat\$ or static\$ or pub\$ place or park\$ or garden\$ or public event\$ or event\$ or concert\$ or outdoor\$ or walk\$ or (sport and (water\$ or winter\$)) or build\$ or house\$ or flats or tent\$ or veranda\$ or blind\$ or umbrella\$ or awning\$ or cover\$ or shelter\$ or foliage or green\$ or tree\$ or plant\$ or nature or wind break\$ or barrier\$ or purpose\$ or childhood or secondary\$ or college or univ\$ or work\$ or lunch\$ or play\$ or game\$).mp
25. beach\$.mp or bathing beaches/
26. swimming/ or swimming.mp
27. swimming pools/
28. environmental exposure.mp
29. schools/ or school\$.mp
30. universities/ or university.mp
31. work\$.mp
32. or/24-31
33. (provi\$ or distribut\$ or prescri\$ or free or hand out or give\$).mp
34. (hat\$ or sunhat\$ or glasses or sunglass\$ or visor\$ or sun screen\$ or sunscreen\$ or sun block\$ or cover up).mp
35. protective clothing/
36. 33 and (34 or 35)
37. qualitative research/

38. (qualitative\$ or focus or discussion\$ or case stud\$ or interview\$ or questionnaire\$ or evaluat\$ or (research\$ and (participant\$ or action\$ or priorit\$ or activit\$)) or observation\$ or focus\$ or case stud\$ or verbal interaction\$ or process or implementation or perception\$ or attitude\$ or view).mp
39. or/37-38
40. (chemical or nuclear or biolog\$ or throat\$ or lung\$ or bowel\$ or liver\$ or colon\$ or breast\$ or cervical\$ or pancre\$ or testic\$ or bone\$ or recta\$ or laryn\$ or prostate or stomach\$).mp
41. 8 and 14 and 23 and (32 or 36) and 39
42. 41 NOT 40
43. limit 42 yr="1990 – Current"