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NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Sunlight Exposure: Communicating the Benefits and Risks of Ultraviolet Light to the General Population: Barriers and Facilitators Review

Final Report

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Executive Summary

1. INTRODUCTION

The National Institute for Health and Care Excellence (NICE) Centre for Public Health (CPH) commissioned this systematic review of the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices to inform the development of public health guidance.

2. METHODS

This evidence review was conducted according to the NICE public health methods guidance[1]. The review was guided by a project protocol developed in close collaboration with the NICE Centre for Public Health (CPH). The protocol was developed on the basis of a NICE scope document[2] and contract of work which specified the research questions, the eligibility criteria and record selection process, the quality assessment and data extraction process, and the timelines of the project.

2.1 Research Questions

The review investigated the following question and sub-questions:

What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices? How does this vary by subpopulations?

- What are people's knowledge, beliefs, attitudes and perception of the benefits and risks of sun exposure?
- How do people make judgments about risk from sun exposure and how does this influence decisions about sun exposure and protection practices?
- How do people interpret and respond to conflicting messages on sun exposure and health? To what extent are they aware that messages differ according to individual risk factors?
- From what sources do people gain their knowledge regarding safe sun exposure (for example, news media, health professionals, peers)? What is the relationship between the source of knowledge, levels of accurate knowledge (guided by PH32)[3] and sun exposure and protection practices?
- How do healthcare professionals, people working with children, journalists and others perceive their role in both the provision of health risk information and in aiding the public understanding of health risk? What are the barriers and facilitators to their role?
- What has been the impact of increased knowledge of the benefits of vitamin D on sun exposure practices?
- To what extent do people understand the UV Index? How does it affect their sun exposure and protection practices?

2.2 Selection Criteria

Inclusion Criteria

Studies eligible for inclusion in this review needed to meet the following eligibility criteria:

- Report the perspectives of the general population, specific subgroups of the population (including people at increased risk of cancer, at increased risk of vitamin D deficiency) and health professionals, people working with children, journalists, parents and those with a duty of care;
- Report reviews or primary research (randomised controlled trials, cohort studies, case-control studies, cross-sectional studies, surveys, interview studies and focus group studies);
- Report findings relevant research questions for this review, outlined in section 2.1;
- Be published in 2008 or later, and in English;
- Be primary research studies conducted in the UK or have reported barriers and facilitators as part of an intervention in an OECD country or be systematic reviews (with studies from any country).

Eligible studies needed to address one of the following research objectives:

- Reports or reviews of research evaluating the effectiveness of interventions conveying the risks or benefits of safe sun exposure, where barriers and facilitators are either the main focus of the research or are mentioned in addition to the other primary outcomes being measured;
- Reports or reviews of questionnaires, surveys or focus groups which have investigated (in relation to UV exposure) any barriers, facilitators, knowledge and understanding, judgements, decision-making, responses, interpretation, knowledge sources, knowledge accuracy;
- Reports or reviews of questionnaires, surveys or focus groups which have investigated the role (knowledge, confidence, practice, intentions) that professional intermediaries, including healthcare professionals and others, play in conveying complex sun exposure risk information, and their experiences in that role.

Exclusion Criteria

Studies were excluded if they only featured barriers and facilitators in relation to interventions that aimed to:

- Manage vitamin D deficiency;
- Manage skin cancer;
- Prevent secondary skin cancer (activities that aim to prevent a re-occurrence);
- Manage conditions that may increase the risk of vitamin D deficiency. Examples include: end-stage liver disease; renal disease; fat malabsorption syndromes such as cystic fibrosis, coeliac disease and inflammatory bowel disease; or conditions treated with drugs that affect vitamin D metabolism;
- Manage conditions that may increase the risk of skin cancer (for example, epidermolysis bullosa, Gorlin syndrome or a weakened immune system);
- Manage conditions treated with drugs that mean increased exposure to sunlight is not advised (for example, certain antipsychotic drugs);
- Assess the effectiveness of, or compliance with, indoor tanning regulations.

Studies that only reported the conduct of an intervention, without reporting outcomes of interest to this review, were not eligible for inclusion.

Case reports of less than five individuals were not eligible for inclusion. Primary studies undertaken in countries other than the UK were not eligible for inclusion.

2.3 Assessing Quality of Studies

Primary studies were quality assessed using appraisal checklists from the NICE public health methods guidance [1]. Systematic reviews were assessed using AMSTAR [4]. Quality was assessed by one reviewer and checked by a second reviewer. Disagreements were resolved through consensus and if necessary a third reviewer was consulted.

The SRs were graded as 'good quality' [++] if they met eight or more of the eleven AMSTAR criteria, 'moderate quality' [+] if they met five to seven of the criteria and 'poor quality' [-] if they met four or fewer.

Primary studies were rated:

- '++' good quality (All or most of the checklist criteria have been fulfilled and the conclusions are unlikely to alter where the criteria has not been fulfilled);
- '+' moderate quality (Some of the criteria have been fulfilled and the conclusions are unlikely to alter for the criteria that have not been fulfilled or not adequately described);
- '-' poor quality (Few or no criteria have been fulfilled and the conclusions are likely to alter).

The evidence statements take account of the quality and consistency of the findings and the applicability of the evidence for each of the research questions. Evidence was graded as strong (mostly [++] quality rated studies), moderate (mostly [+] quality rated studies) and weak (mostly [-] quality rated studies).

3. RESULTS

13,900 records were assessed for relevance, after deduplication. A total of 20 studies were included in the review.

Evidence Statement 1

There is inconclusive, consistent evidence from four poor quality studies [-][5] [6-8] conducted in British adults investigating people's sources of knowledge about safe sun exposure. The main source of knowledge in all four studies was the media; this included television, magazines and newspapers. In two studies, television was the main source of knowledge, followed by magazines, then newspapers; the other two studies did not define the different media types. One study reported that women were significantly more likely than men to gain knowledge about skin cancer from all sources, and younger people under 25 years were significantly more likely to gain information about safe sun exposure from the internet than older people aged over 64. Other reported sources of knowledge were health professionals, family and friends and school education.

[5]Butler *et al.* (2013) [-]
[6]Gavin *et al.* 2012 [-]
[7]Hedges *et al.* 2010 [-]
[8]Morris *et al.* 2011 [-]

Evidence Statement 2

There is inconclusive evidence from one poor quality study [7] about the relationship between people's source of knowledge and levels of accurate knowledge. The study, conducted in adults in a London public park showed that while the majority of participants agreed that sunbathing without sunblock increased the risk of skin cancer, fewer participants named sunblock as a sun protection measure and approximately half of participants proposed only one sun protection measure.

There is inconclusive, inconsistent evidence from one moderate quality systematic review (containing two poor quality studies) [9] and two poor quality studies about the relationship between people's source of knowledge, and their consequent sun exposure and protection practices. One moderate quality systematic review [9] reported significant self-reported behaviour change in the sun protection practices of baseball game attendees remembering a sun protection campaign during the game in one study, and a significant number of lesions excised following a television advertising campaign aimed at the Australian general public. One poor quality study conducted in British construction workers [10] reported that participants who had received sun safety training were more likely to wear long sleeved tops and trousers (OR, 1.69; 95% CI: 1.02–2.80) and sunglasses (OR, 1.85; 95% CI: 1.10–3.13) while working in the sun. The second poor quality study conducted in a public park [7] showed that while the majority of participants agreed that sunbathing without sunblock increased the risk of skin cancer only 17% of participants had applied sunblock on the day the data was collected.

[7]Hedges *et al.* (2010) [-]
[9]Eagle *et al.* (2009) [+]
[10]Diffey *et al.* (2009) [-]

Evidence Statement 3

There is inconclusive evidence from one poor quality study in British adults about how people understand the UV index. [8] Sixty-seven percent had heard of the UVI, however only 13% knew that the maximum value was 10 (in the UK) with 63.5% indicating that the maximum value was 17. Eight percent of participants knew the UVI value on the day of the survey.

There is inconclusive, consistent evidence from three poor quality studies [9-11] in British adults that increased knowledge about the UV index does not lead to changes in sun protection practices. No differences in sun protection practices were reported in one study conducted from the UK SunSmart website asking participants whether they used the UV index (OR (of 'yes' respondents) 1.17; 95% CI 0.94-1.45, p=0.16) [10]; one study reported that 60% of respondents stated that knowing the UV index value did not influence their sun protection behaviour [8]; the third study reported that sun safety training was not associated with check the UV index (p=0.07) [11]. One moderate quality systematic review [9] identified one primary study from Sweden showing contradictory results; a significant increase in sun protection knowledge and decrease in sunbathing frequency among adults who received information about UV radiation intensity.[9]

[9]Eagle *et al.* (2009) [-]
[11]Madgwick *et al.* (2011) [-]
[8]Morris *et al.* (2011) [-]
[10]Diffey *et al.* (2009) [-]

Evidence Statement 4

There is inconclusive evidence from one moderate quality [+] qualitative study [12] that UK university students do not consider numerical probabilities when estimating their skin cancer risk. Fifty percent of participants rated their risk of skin cancer as being lower than that of the average person and compared their own skin cancer risk with that of their peers by considering sunbed use and holidays abroad (50%) and personal features such as skin colouring, hair colour and genetics (35%). Eight percent of participants considered prevalence of skin cancer in their response.

[12]French *et al.* (2008) [+]

Evidence Statement 5

Two poor quality qualitative studies reported unintended outcomes from interventions that that aim to deter people from using or seeking information about sun [13, 14] Despite being 'shocked' and 'frightened' about seeing personalised images of sun damaged/aged skin as a result of UV exposure, participants in both studies were able to draw positive aspects about the images. Some men were pleased that the UV exposure made them look tough [13] and some women were pleased that their skin looked so good under a UV scanner despite previously risky behaviour. [14]

[13]Williams *et al.* (2013a) [-]
[14]Bird *et al.* (2011) [-]

Evidence Statement 6

Evidence from one good quality [++] systematic review [15] (3 of 12 studies from the UK) and one poor quality [-] UK quantitative survey [5] in 1000 individuals, indicated that individuals with family members or friends who have experienced melanoma or pre-cancerous moles have higher perceptions of the risk of skin cancer and some take sun protection measures. However, individuals without such experience are less likely to appreciate the risk of skin cancer and this is particularly the case with young children (aged 6-8 years) and young people (aged 12-25 years approximately), who view the risk as too distant to be a serious concern. Evidence from one poor quality [-] online survey [10] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, mean age not reported, 79% female) found that perception of skin cancer risk did not appear to influence the use of multiple simultaneous methods of sun protection (perceived risk of skin cancer high/moderate odds ratio 1.09 (95% CI 0.87–1.37, p= 0.4329). There is weak consistent evidence that adults are aware of the risks of skin cancer, but avoid thinking about them, or adopt an optimistic framing that minimises their own perceived susceptibility, such as assuming that others' exposure to risk factors must be higher than their own.

There is weak consistent evidence from three UK studies to suggest a link between skin propensity to burn and sun protection behaviours. These included one poor quality [-] UK quantitative survey [5] of 1000 general practice patients (≥ 16 years and 67.3% females) where 57.8% of respondents with skin that usually burns in the sun agreed to the statement "I apply sunscreen when I am in the sun for > 1 hour always/most of the time". One poor quality [-] online survey [10] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, mean age not reported, 79% female) also found that the strongest predictor for the use of sun protection tools (shade, sunhat, clothing and use of SPF 15+ sunscreen) was predisposition to sunburn (people with skin that burns easily in the sun are more than twice as likely to adopt two or more sun protection strategies than people with melano-competent skin (usually tans) or melano-protected skin (born with dark skin, does not go red): Odds Ratio 2.24 (95% CI 1.83–2.74), $p < 0.0001$. One moderate quality [+] quantitative UK survey [16] of 321 children aged 13 to 17 years found that skin type was a statistically significant predictor of adolescents' sun protection behaviour (sunscren use, wearing a hat or T short and seeking shade in the middle of the day) (Beta = 0.11, Standard error beta = 0.03, $R^2 = 0.15$, $p<0.01$).

There is consistent evidence from two good quality [++] systematic reviews [15 17] that young people and adults may have mistaken beliefs about sun exposure, believing that it provides "resistance" to skin damage, burning or cancer in the future, and that a darker skin colour decreases risk level for skin damage and cancer. One study found that participants of higher socioeconomic status were more aware of the risks.

[15]Lorenc *et al.* (2010) [++]
[5]Butler *et al.* (2013) [-]
[10]Diffey *et al.* (2009) [-]
[16]Mewse *et al.* (2011) [+]
[17]Garside *et al.* (2009) [++]

Evidence Statement 7

There is moderate evidence from one good quality systematic review [15] that perceived severity of skin cancer can act as a barrier to sun protection practices. Perceived susceptibility of skin cancer was low in all studies across age groups; the majority of participants did not view skin cancer as a serious threat.

There is strong evidence from one good quality systematic review [17] and three poor quality studies [13, 14, 18] that perceived susceptibility of sun exposure can act as a barrier to sun protection behaviours. Perceived susceptibility to sun exposure in terms of developing skin cancer was low across studies, however skin aging was seen to be a serious consequence of sun exposure.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]
[18]Williams *et al.* (2012) [-]
[13]Williams *et al.* (2013) [-]
[14]Bird *et al.* (2011) [-]

Evidence Statement 8

There is weak consistent evidence from four poor quality UK studies that younger people are more likely to experience sunburn, and less likely to avoid the midday sun, wear protective clothing or wear sunscreen when in the sun than older people. A poor quality [-] online survey [10, 14] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, 79% female) reported that people under 35 years of age were 2.34 times more likely to report recent sunburn than older people ($p<0.0001$). A poor quality [-] survey [5] of 1000 UK general practice patients (≥ 16 years and 67.3% females) found that patients aged 16-30 were significantly less likely to avoid the midday sun compared to older people (e.g. age 16-30 = 35.9% and age 46-60=59.9%, $p<0.001$); those aged 16-30 were significantly less likely to wear protective clothing always or most of the time (e.g. age16-30 = 30.8% and age 46-60=54.9%, $p<0.001$); those aged 16–30 years were significantly less likely to wear sunscreen 'always/most of the time' when in the sun for over one hour compared with older people (e.g. age 16-30 = 44.6% and age 46–60 = 54.1%, $p=0.05$). A poor quality [-] household survey [6] of approximately 2000 randomly selected people (≥ 16 years) in Northern Ireland, found that younger people are less likely to engage in sun protection practices compared to older people in terms of avoiding the midday sun. A poor quality [-] survey study [11] with a convenience sample of 360 male construction workers found that covering up in the sun by wearing long sleeved loose fitting tops and trousers (OR, 1.03; 95% CI, 1.01–1.05) was positively associated with age.

[14]Bird *et al.* (2011) [-]
[5]Butler *et al.* (2013) [-]
[11]Madgwick *et al.* (2011) [-]
[6]Gavin *et al.* (2012) [-]

Evidence Statement 9

There is weak consistent evidence from three poor quality studies that men and women behave differently in terms of sun protection practives. One poor quality [-] survey [5] of 1000 general practice patients (≥ 16 years and 67.3% females) in the UK, found that women were significantly more likely than men to wear sunscreen (57.4% vs. 38.6%, $p < 0.001$). One poor quality [-] household survey [6] of approximately 2000 randomly selected people (≥ 16 years) in Northern Ireland, found that women were more likely to wear sunscreen than men (76% vs. 63%, $p<0.001$). Women were: more likely to never go out in the sun (11% vs. 6%, $p=0.002$), more likely to avoid the midday sun (30% vs 19%, $p<0.001$), more likely to stay in the shade (29% vs. 18%, $p<0.001$) and more likely to conduct regular skin checks (9% vs. 6%, $p=0.05$) than men. However, women were just as likely to cover up as men (23% for both men and women) and less likely to wear a hat (28% vs. 37%, $p=0.001$). In a poor quality [-] UK survey study [7] using face to face interviews with 100 young adults (aged 18 to 28 and 56% females) in two London public parks men cited convenience over cosmetic issues (females) as the primary barrier to use of sun protection methods. Men were concerned over expense (sunscreen) and females over other barriers, such as weather conditions not requiring sun protection methods to be used[7]. Women used sunscreen more than men, and higher sun protection factor sunscreen (exact SPFs not specified) was being used more frequently by females (no data reported) [7].

[5]Butler *et al.* (2013) [-]
[6]Gavin *et al.* (2012) [-]
[7]Hedges *et al.* (2010) [-]

Evidence Statement 10

There is weak evidence from one poor quality [-] mixed methods UK study [14] that training and a facial imaging intervention (UV facial scanner to highlight skin type and early signs of sun damage) can improve some sun protection knowledge and intentions in students (n=600) and trainee beauticians. The study involved 600 teenage students aged 15 to 19 (60% female) and beauty school trainees (n=51) in Devon. Trainees (all female) reported increases in knowledge about how to protect skin (5.3 before vs. 6.2 after); increase in knowledge about how to identify different skin types (4.5 before vs. 5.9 after); and increase in confidence in advising about skin cancer (3.9 before vs. 5.6 after) (No p values were reported). However, knowledge acquisition can be selective as evidenced by the 73% of trainees who said they would increase use of sunscreen compared to 9% who mentioned covering up, despite teachers emphasizing that sunscreen was the least important form of protection. The study demonstrated small increases in many knowledge areas and sun protection intentions, but numbers and p values were not reported.

[14]Bird *et al.* (2011) [-]

Evidence Statement 11

There is weak evidence from one moderate quality [+] survey study [16] from the UK of 402 school children aged 13 to 17 (51% females) that parental authoritativeness (parents who convey both above average levels of supportiveness, and exercise above average levels of behavioural control) in the home is an important predictor of adolescent use of sun protection: R^2 adj value of 0.55 was significantly higher in Model 2 which included this variable (F change (1,311)=23.41, $p<0.001$), than in Model 1 (R^2 adj =0.52).

Friends' parents' authoritativeness was also an important predictor of adolescents' use of sun protection: the R^2 adj value of 0.56 was significantly higher in Model 3 which included this variable, than in Model 2 (F change (1,310)=4.67, $p<0.05$) but friends' parents' authoritativeness was not an important predictor of adolescents' sunbathing behaviour: the R^2 adj value of 0.24 was not significantly higher in Model 2, which included this variable (F change (1,337)=2.40, $p<0.05$), than in Model 1 (R^2 adj =0.24) leading to the conclusion that time spent sunbathing was associated with friends' behaviours.

[16]Mewse *et al.* (2011) [+]

Evidence Statement 12

There is strong, consistent evidence from two systematic reviews (one identifying two studies [15] and one identifying three studies [17] that institutional policies may cause barriers to sun protection practices. Schools expressed concern regarding the cost of implementing new policies and about liability (in the event of an allergic reaction to sunscreen, for example). Effective communication with parents was identified as a potential barrier and the cost to parents was also mentioned as a concern relating to compulsory hat regulations. Staff were willing to ensure that scheduled outdoor activities don't take place at the hottest time of day, but it was notes that there is limited ability to change scheduling around lunchtime

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence Statement 13

There is strong, consistent evidence from two good quality systematic reviews [15 17] and three poor quality studies [7, 11, 14] that positive perceptions of tanned skin can act as a barrier to sun protection practices. All included studies reported that a tanned appearance was seen as healthy, attractive and/or aesthetically pleasing by participants while white skin was viewed as unattractive with participants using terms such as "*ugly*" and "*pasty*" to describe untanned skin.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]
[14]Bird *et al.* (2011) [-]
[11]Madgwick *et al.* (2011) [-]
[7]Hedges *et al.* (2010) [-]

Evidence Statement 14

There is strong, consistent evidence from two good quality systematic reviews, (one identifying eight studies [15] and one identifying seven studies [17] that incidental tanning (i.e. tanning from carrying out activities outdoors) was less dangerous and less likely to require sun protection compared with deliberate tanning which was viewed as unhealthy.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence statement 15

There is strong evidence from one good quality [++] systematic review [15] that included ten studies, two of which were from the UK, that a barrier to the use of sun protective clothing among children and young people (aged 6 to 20) is its perception as unfashionable or unattractive. Adults reported that sun protection was not strongly supported by social norms and that sunscreen use has a strong association with particular contexts such as being on holiday. Young people (aged 12 to 17) see media messages and parental behaviours regarding sun protection as focused on young children and not relevant to them; and some men see sunscreen use as un-masculine.

[15]Lorenc *et al.* (2010) [++]

Evidence Statement 16

There is strong, consistent evidence from two systematic reviews, one of good quality (identifying seven studies) [15] and one of moderate quality (identifying one primary study) [9] that perceived health benefits, specifically regarding the benefits of vitamin D exposure, can act as a barrier to sun protection practices. Additionally, sun exposure was thought to increase the skins protective qualities against future sun damage by increasing resistance.

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

Evidence Statement 17

There is inconclusive evidence from one good quality systematic review [17](identifying nine primary studies) about parental responsibility as a barrier to sun protection practices. Parental responsibility may be limited due to parent's failure to demonstrate sun protection practices themselves, ambivalence about their own desire for a tan, and the fact that parents are not always with their children to enforce sun protection practice (for example when children are at school) There was inconclusive evidence about the role of education and recreation workers as a barrier to sun protection for children and a lack of clarity about where responsibility lies.

[17]Garside *et al.* (2009) [++]

Evidence Statement 18

There is strong, consistent evidence from two good quality systematic reivews (one reporting ten studies [15] and one reporting six studies [17] with a total of four studies conducted in the UK) that there are perceived practical barriers to sun protection practice. Sunscreen use was seen as a hassle in the majority of studies due to its expense, messiness, time to apply and potential to cause irritation or allergies; parents reported that sunscreen application was difficult in uncooperative children. Additional practical barriers to sun protection included hat wearing limiting children's activities and long clothing being uncomfortable in the heat.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence Statement 19

There is strong, consistent evidence from two good quality systematic reviews (one identifying 10 primary studies [15], the other three primary studies [17]) that parents are an important source of positive encouragement and practical support for adopting sun protective behaviours for children and young people (ten studies). Evidence about sources of positive influences for adults was inconclusive.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence Statement 20

There is strong, consistent evidence from two good quality systematic reviews (one including five primary studies [15] the other including four primary studies [17]) that knowing someone with skin cancer may motivate people to adopt sun protection behaviours.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence statement 21

There is strong, consistent evidence from one good quality systematic review [15] (including six primary studies) that primary school teachers are willing to implement sun protection policies (three studies). Evidence was less clear for policies in secondary schools (two studies), outdoor pools (one study) and other community venues (one study).

[15]Lorenc *et al.* (2010) [++]

Evidence statement 22

There is consistent evidence from one good quality [++] systematic review [15] of seven studies (three of which were from the UK) that adults of all ages were more likely to use sun protection in general in summer and in sunny weather. Two study reports from the UK, one of male outdoor workers (aged 20-50 years) and the other of young women (aged 12-15 years), reported the belief that sun protection measures are not required in the UK due to the lack of hot, sunny weather. Two study reports (one Swedish and one from the UK) described adults (aged 16-54 years) putting on a T-shirt or applying sunscreen only after beginning to burn.

[15]Lorenc *et al.* (2010) [++]

Evidence statement 23

One good quality [++] systematic review [15] identified three studies from the USA and Australia in which young adults (18 to 25 years) and adults discuss the influence of the media on individuals' behaviour. All of these studies show the belief that representations in the media may have an adverse effect on sun protection behaviours. For example, a study participant pointed out that characters in the TV programme *Baywatch* are never seen applying sunscreen.

A second good quality [++] systematic review [17] included nine studies that discuss aspects of media campaigns about skin cancer prevention. Three were from the UK. There was good recall of a UK TV advert and its key messages to cover up and use sunscreen (1 study). Adolescents viewed the general mass media portrayal of tans as appealing. In another study who were categorised as having high concern about sun safety were aware of a lot more negative publicity about the potential negative affects of sun exposure compared to those categorised as having low concern. Three studies indicated that media campaigns need to engage younger children, and two suggested that this should be achieved whilst not alienating older children. One of the studies suggested that programmes need to change regularly to maintain their impact and that another suggested that shock images may appeal to older boys.

One poor quality [-] qualitative study [19] used focus groups to explore influences on the sun exposure behaviours of 28 girls in the UK, aged 12–15 years including health promotion messages in the media. The participants were able to recall adverts and remember the health messages in them. However, they felt that the messages did not target their age group as they mainly focused on younger children and adults. Additionally, participants stated that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan. Participants were eager to provide examples of times that they refused to listen and adhere to sun protection suggestions at school. It was unclear how much this was due to rebellion, or a desire to conform to prevailing cultural norms, and impress peers. Respondents asserted that they felt bombarded with health messages relating to other issues, including smoking and healthy eating and compared to these, sun exposure was not considered as an important health concern. The authors recommend that health promotion messages specifically target teenage girls but did not state how this might be achieved.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Evidence statement 24

There is weak evidence from three poor quality [-] qualitative studies [13, 18, 20] from the UK (groups of 43 male university students, 47 female unviersity students, 60 school children median age 12.58) that using a photoaging intervention can generate awareness of the damage caused by sun exposure and intentions to adopt sun protectvie behaviour. However there were some slight gender and age differences. The majority of men (32/43, 74%), the majority of adoelscents and all of the women taking part in interviews and focus groups said that viewing the photographs may have an effect on their future sun protection and/or sun exposure behaviours due to the shock of seeing the effect of UV exposure on their skin.

There is weak evidence from one poor quality [-] mixed methods UK study [14] used a facial imaging intervention with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon. The intervention involved training 66 beauty therapy students and tutors to use a UV facial scanner to highlight skin type and early signs of sun damage in study participants. 31/51 trainers (77%) said they planned to change their own sun habits as a result and 61% wrote comments such as: "Try and find a hat that I like and feel happy wearing"; "Yes. Be more aware of the time of day and wear a hat etc.": "Wear more sun cream. Don't go out in peak times." Most comments referred to using sunscreen more often.

[13]Williams *et al.* (2013a) [-]
[20]Williams *et al.* (2013b) [-]
[18]Williams *et al.* (2012) [-]
[14]Bird *et al.* (2011) [-]

Evidence statement 25

There is weak evidence from four studies that directly elicited views from people who had been the recipients of photoaging or UV scanner interventions that these interventions had an emotional impact relating to the extent of damage caused by sun exposure [13, 18, 20], [13]. Three poor quality [-] qualitative studies [13, 18, 20] from the UK (groups of 43 male university students, 47 female unviersity students, 60 school children median age 12.58) generally elicited emotional views of disgust from participants when viewing images of how they would look with sun damaged skin [13]. However, there were a minority of men who valued looking masculine and a minorityof women who were relieved that their skin was not as damaged as they had feared given past sun exposure. Trainee beauty therapists who received an appearance-based intervention expressed concern about the images of skin damage and skin ageing they had seen during their training sessions for example, '*The results from my scanner image made me more aware*.'[14]

[13]Williams *et al.* (2013a) [-]
[20]Williams *et al.* (2013b) [-]
[18]Williams *et al.* (2012) [-]
[14]Bird *et al.* (2011) [-]

Evidence statement 26

Weak evidence from one poor quality qualitative study [19] of UK focus groups about health promotion messages conducted with 12 to 15 year old girls showed that although the participants could remember the health promotion adverts and health messages in them, they felt that the messages did not target their age group and in addition, even in health promotion messages, models continued to be depicted as brown and attractive [19].

[19]Curtis *et al.* (2009) [-]

Evidence statement 27

There is consistent evidence from one good quality systematic review [++] [15] of seven primary studies that there are both accurate and erroneous perceived health benefits of sun exposure. Three studies reported the belief that ultraviolet exposure is beneficial because it provides vitamin D; two studies reported that sun exposure is believed to protect against future skin damage or cancer; and three studies discuss the perception that outdoor activities that involve sun exposure are healthier than indoor activities [15].

There is weak evidence from one poor quality systematic review [-] [9] that in an Australian study people significantly overestimated the amount of sunlight needed to maintain healthy Vitamin D levels. The review reported that misconceptions regarding Vitamin D and sun exposure might influence people to reduce existing sun protection behaviours [9].

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

Evidence statement 28

There is strong evidence from one good quality [++] review [15] that included three studies from the USA and New Zealand that suggests service providers, or potential service providers such as teachers, other school staff and staff at leisure facilities, were generally optimistic about the prospects for intervention and policy change, and willing to take an active role in implementing policy. Staff in schools who had implemented integrated sun-protection policies were actively engaged in modelling and encouraging good sun protection practices. However, in some cases, potential service providers were concerned about the potential extension to their responsibilities. There was also the risk, of an overload of policies and recommendations leading to a lack of clarity about what activities to prioritise. There may be differences between countries in the organisational context of service delivery, which may create barriers to the applicability of these findings to the UK context.

There is weak evidence from a poor quality [+] evaluation [21] of the implementation of a SunSmart campaign in pharmacies in Devon that pharmacists in both the standard SunSmart campaign (posters, leaflets and postcards) and the enhanced campaign (with training and quizzes) acknowledge that they have a role in promoting skin cancer awareness and skin cancer prevention and act on it. However, involvement in the campaign was voluntary and only 50% of invited pharmacies volunteered.

[15]Lorenc *et al.* (2010) [++]
[21]Bird *et al.* (2011) [+]

Evidence statement 29

Two good quality systematic reviews reported on how health care professionals and others with a duty of care perceived their role in providing health risk information and in aiding the public understanding of health risk. [9, 15]

One review included three primary studies showing that service providers, including school staff and leisure staff have positive attitudes towards resource provision and environmental change interventions. However, a further two primary studies reported concerns about the potential extension to their responsibilities and one study raised the prospect of an overload of policies and recommendations [15].

The second review included two primary studies. School and recreation workers recognised their potential role in educating parents, but identified that there might be barriers to teachers' involvement in providing education about safe sun behaviour in relation to who should teach it, to whom and how often .[9].

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

4. DISCUSSION

The review was intended to include studies of both over- and under-exposure to UV, however no studies on under-exposure were identified.

4.1. Implications of Findings for the Nice Scope Questions

From what sources do people gain their knowledge regarding safe sun exposure (for example, news media, health professionals, peers)?

The majority of people gain their information on skin cancer prevention from traditional media such as television, radio and newspapers, but in particular television. There was very little evidence investigating the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices. Mass media interventions appear to be successful in raising awareness levels but do not appear to confer long-term behaviour change.

Individuals rarely proactively seek information. Younger people were the group most likely to seek sun exposure information from friends and family, and as a group were more likely to use the internet to gain information than older people. Different information sources may be used by men and women or younger and older people but evidence is sparse. Reactions to interventions presenting the impact of UV exposure in terms of skin damage vary by age and gender.

There is little evidence that health care professionals are seen as a source of information about sun protection.

7.2.2 How do people make judgments about risks from sun exposure and how does this influence decisions about sun exposure and protection practices?

Although there is some evidence that people understand the need for sun protection behaviours and that sunscreen and other measures are protective, there was evidence that people did not act on this knowledge and, when they do, may only implement one sun protection activity. There was a lack of research asking people why they did not act on what they knew or suspected to be best practice, although where they did respond, a range of reasons were provided including hassle and desire for the positive experiences of having a tan such as perceived healthiness and well-being and attractiveness.

7.2.3 What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices?

This review did not identify research which provided explicit information on this chain of relationship. There is little evidence on the relationship between the knowledge source and levels of accurate knowledge or sun exposure and protection practices. There are high levels of misunderstanding and misinterpretation of the advice on sun protection that is provided from campaigns, training and the information provided by other people. Individuals do not seem implement the sun protection practices that they do know about.

Individuals feel “bombarded” with health messages relating to a range of issues including smoking, alcohol and obesity, in comparison with which, sun exposure was not considered to be as important. Individuals are making optimistic assessments of skin cancer likelihood are being made and this may indicate that generally sun exposure may not be being linked to the probability of getting skin cancer.

Individuals with family or friends with melanoma or pre-cancerous moles are more aware of the risks of sun exposure, but may still not translate this into sun protection practices. For those without such prior knowledge or experience, the risk of skin cancer is not appreciated or is seen as not of immediate concern, particularly among children. People avoid thinking about skin cancer or adopt an optimistic framing that minimises their own perceived susceptibility, such as assuming that other people’s exposure to risk factors must be higher than their own. Studies presented a range of voiced opinions and beliefs about UV exposure that were highly inaccurate and uninformed so that it appears that messages about the risks of sun exposure are not being well understood or remembered accurately. Concurrently, people do not appear to be mentioning the benefits of sun exposure as a justification for sun exposure habits, suggesting that the beneficial effects are even less well appreciated.

Studies in adults found that skin cancer was thought to be easily cured, was considered a possible future concern, and was something people preferred not to think about or where potential concerns were outweighed by the perceived short term benefits of a tan. It seems that the visible signs of sun damaged skin (wrinkles, spots, freckles) may be taken more seriously than the risk of skin cancer. There was no research showing the negative impacts of inadequate sun exposure such as rickets. Sun exposure messages, advice and the use of the UV index are competing against the beliefs that a tanned appearance is attractive and that white skin is unattractive, unhealthy and indicative of being unfit.

7.2.4 To what extent do people understand the UV Index? How does it affect their sun exposure and protection practices?

There is low awareness and understanding of the UV index and even lower levels of action based on the information it conveys. A barrier to the uptake of sun exposure messages may be the misperceptions around the UK climate, that sun protection is not so applicable due to the lack of hot, sunny weather in the UK.

7.2.5 What has been the impact of increased knowledge of the benefits of vitamin D on sun exposure practices?

There was little evidence that there is increased knowledge of the benefits of vitamin D or that this knowledge has affected sun exposure practices. There was some evidence that the benefits of vitamin D might be over interpreted because people over-estimate how much exposure is required to achieve the required level for vitamin D production.

7.2.6 What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices? How does this vary by subpopulations?

Barriers to risk communication strategies and interventions include:

- Sun damaged/aged skin (photoaging and UV interventions) may not always be seen as undesirable;
- The degree of sun damaged/aged skin (photoaging and UV interventions) may sometimes reassure individuals that their skin is not so badly damamaged, rather deter sun exposure;
- Sun protection is not strongly supported by social norms;
- Sunscreen use has a strong association with particular contexts such as being on holiday;
- Concern over expense (sunscreen);
- Inconvenience of adopting sun protection clothing, sunscreen and hats;
- Perceptions that covering up or wearing clothes on the beach is not fashionable;
- Tans are perceived as healthy, convey fitness and wellness and raise self-esteem;
- Pale skin is seen as pasty and unhealthy;
- Young people are more likely to report barriers to sun protection use than older people;
- Teenagers deem sun protection media messages as not relevant to them.

Facilitators for risk communication and sun protection change included:

- Parents are an important source of encouragement and support for adopting sun protective behaviours for younger children;
- Knowing someone with skin cancer;
- Photaging interventions showing UV skin damage;
- Age and gender group appropriate messaging and context;
- Sun exposure messaging should change regularly.

7.2.7 What are people's knowledge, beliefs, attitudes and perception of the benefits and risks of sun exposure?

Women are more likely to wear sunscreen than men, more likely to never go out in the sun more likely to avoid the midday sun, more likely to use sunscreen, more likely to stay in the shade and less likely to wear a hat than men. Males may attribute convenience as the primary barrier to use of sun protection methods.

7.2.8 How do people interpret and respond to conflicting messages on sun exposure and health? To what extent are they aware that messages differ according to individual risk factors?

There was little evidence that many people perceived conflicts within messages on the risk or benefits of sun exposure and health. The focus of studies identified for this review was very largely on the health risks associated with UV over exposure; few reported health risks associated with UV under exposure, or the balance of risk. This means that the UV exposure message is all 'bad news' and the complex risk message presented for UV exposure is not being addressed in research. However, given the high level of poor understanding of the risks of sun over-exposure, how to communicate effectively a more complex picture of risk and benefit is a considerable question.

There are some UK studies of how people with differing skin types behave and also studies conducted with relatives of people with melanoma, but there was sparse evidence on the extent to which people in general are aware that risks are different given individual circumstances. There was no evidence indicating awareness that certain groups, such as the housebound, should seek to ensure they receive adequate UV exposure.

7.2.9 Do health care professionals and others with a duty of care have pre-existing and/or post intervention views, knowledge, beliefs, attitudes and perceptions of the health benefits and risks of sun exposure which act as barriers or facilitators?

Little information was identified to answer this question.

7.2.10 How do health care professionals and others with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?

There is little evidence that parents can be relied upon to protect their children form the sun. Some parents are ambivalent about sun protection practices and may not be encouraging children to minimise sun exposure. Ensuring children are protected from the sun is seen as inconvenient by many parents and children.

For others with a duty of care to children and other vulnerable groups, lack of clarity about roles and responsibilities may be a barrier to achieving adequate sun protection. Primary school teachers may be willing to implement sun protection policies but evidence was less clear for policies in secondary schools, and it is unclear how much of this evidence is applicable to the UK context.

Sparse evidence was identified on how UK organisations, such as schools, workplaces, swimming pools and other community venues, can help with removing barriers to safe sun exposure practices or facilitate safe sun exposure. There can be institutional barriers to sun protection in settings such as schools. There was no evidence of the success or failure of efforts to achieve change at the organisational level and what factors might contribute to success. Service providers, including school staff and leisure staff may have positive attitudes towards sun protection promotion and environmental change interventions, but may also have concerns about the potential extension to their responsibilities and how to manage new policies. School and recreation workers recognised their potential role in educating parents, but also identified barriers to assisting with sun protection behaviour.

4.1.1. Limitations of the evidence

Few studies were identified which investigated the barriers and facilitators around sun exposure messages (risks and benefits) in specific subgroups and relatively few studies that explored subgroups within a larger population. Thus insights into the specific barriers and facilitators of importance to those subgroups are lacking.

The quality of the studies reviewed was very variable and a high percentage of the systematic reviews and RCTs reviewed were of poor quality.

5. LIMITATIONS OF THE REVIEW AND POTENTIAL IMPACT ON FINDINGS

This review reports on studies published in 2008 or later. Systematic reviews were included which reviewed studies published earlier than 2008 but systematic reviews were not available for all of the questions. This means that all of the available evidence was not included in the review, with unknown consequences in terms of the impact on the direction and strength of the evidence statements.

Abbreviations

CPH	Centre for Public Health
IRR	Inter-rater reliability
NEG	Nutritional Epidemiology Group
NICE	National Institute for Health and Care Excellence
PH32	Public Health Guidance 32
RCT	Randomised Control Trials
SR	Systematic Review
UV	Ultraviolet radiation
UVA	Ultraviolet A
UVB	Ultraviolet B
UVC	Ultraviolet C
YHEC	York Health Economics Consortium

Glossary

Authoritative parenting:	Conveying above average levels of supportiveness and exercising above average levels of behavioural control over one's child(ren).
F test:	Fisher's exact test for a change in outcome
Logistic regression analyses:	Used to estimate the probability of an event occurring and to study the relationship between a dependant and one or more variables.
Melano-compromised skin:	Skin type that turns red easily. Redness can last several days and skin sometimes peels. Skin typically will not tan.
One-sided t-test:	Statistical test of confidence for a certain threshold; looks at either the lower or upper bounds, but not both.
photo-aging:	The damage done to an individual's skin over a lifetime of exposure to UV radiation.
R^2:	Also known as the Coefficient of Determination. Indicates how well a set of data points fit a regression curve.
Simple Measure of Gobbledygook	The SMOG grade is a measure of readability that estimates the years of education needed by an individual to understand a piece of writing in the English language.
"Think aloud" methods:	Methods of data collection involving the individual talking through their actions, feelings, and responses, while performing a specified set of tasks under observation.
unrealistic optimism:	The inclination of an individual to believe themselves less at risk of experiencing a negative event compared to others.
X^2:	Chi squared test

Section 1: Introduction

The National Institute for Health and Care Excellence (NICE) Centre for Public Health (CPH) has contracted York Health Economics Consortium (YHEC) and the University of Leeds' Nutritional Epidemiology Group (NEG) to produce 3 evidence reviews, a documentary analysis and an economic model of interventions that present and disseminate the health risks and benefits of ultraviolet radiation (UV) to the general public. This is the report of the barriers and facilitators evidence review.

1.1 BACKGROUND

Exposure to UV radiation carries with it both positive and negative consequences for human health. Too much UV radiation is associated with an increase in the risk of developing a range of negative health conditions including, most notably, skin cancers, eye conditions including cataracts, and immunosuppression [22]. Exposure to too little UV radiation can lead to health problems related to inadequate vitamin D, an essential nutrient required to help maintain calcium and phosphate levels in the body and to maintain healthy bone and skeletal growth. Furthermore, there is increasing recognition that vitamin D may have an important role to play in human health and poor vitamin D status has been linked with a range of chronic diseases such as cancers and cardiovascular disease (CVD) as well as markers of cardiometabolic health including obesity and type 2 diabetes mellitus [23].

In the UK, attempts to proactively communicate the risks associated with too much or too little UV exposure have been made through various media. Sun protection messages have been advanced through the mass media [24], through workplace leaflets produced by the Health and Safety Executive [25], through checklists for school children and teachers produced by charitable organisations, and through the direct advice of health practitioners working in the NHS and local authorities, amongst others [3].

These interventions have employed a variety of techniques. Appearance-based interventions use imagery of the damaging effects of UV exposure to try to change attitudes and behaviours towards UV protection [26] [18]. Behavioural counselling techniques involve directly communicating UV protection messages through a number of channels. These include primary care interactions, self-guided booklets and 30 minute peer counselling sessions.

The overall efficacy of attempts to communicate the risks of UV exposure is unclear. While there is evidence that the awareness of the risks has increased, so has the incidence of skin cancer [26]. This has been explained through the 'knowledge-behaviour gap' [27] whereby individuals are aware of the consequences of activities but continue to practise them. Conflicting agendas that seek to advise both more sun exposure, in the case of vitamin D

deficiency, and less exposure, in the case of skin cancer avoidance, may have resulted in a confused message [24].

In the UK NICE have published Public Health Guidance 32 (PH32), which sets out the need to communicate the risks related to UV exposure from the perspective of skin cancer risk [3]. The guidelines make recommendations for a national mass-media campaign alongside local information provision, and set out who should be involved and how. The guidelines promote an integrated message targeted at high risk population groups that acknowledges and challenges commonly held perceptions around UV exposure. They also acknowledge the need for a balanced message that incorporates an understanding of the health benefits of UV exposure. NICE will also publish guidelines to inform the implementation of existing guidance on the prevention of vitamin D deficiency in November 2014.

To complement these guidelines NICE CPH are developing further guidance on UV exposure from sunlight focusing on the most effective and cost effective ways to communicatie the risks and benefits to the general population. This review will inform the development of that guidance.

1.2 AIM OF THE REVIEW

The aim of this review was to review the evidence of factors or circumstances that form a barrier and/or facilitator to the implementation of risk communication strategies seeking to present and disseminate complex health risk information relating to UV radiation exposure.

1.3 RESEARCH QUESTIONS

The review investigated the following question and sub-questions:

What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices? How does this vary by subpopulations?

- What are people's knowledge, beliefs, attitudes and perception of the benefits and risks of sun exposure?
- How do people make judgments about risk from sun exposure and how does this influence decisions about sun exposure and protection practices?
- How do people interpret and respond to conflicting messages on sun exposure and health? To what extent are they aware that messages differ according to individual risk factors?
- From what sources do people gain their knowledge regarding safe sun exposure (for example, news media, health professionals, peers)? What is the relationship between the source of knowledge, levels of accurate knowledge (guided by PH32)[3] and sun exposure and protection practices?
- How do healthcare professionals, people working with children, journalists, etc. perceive their role in both the provision of health risk information and in aiding the

public understanding of health risk? What are the barriers and facilitators to their role?

- What has been the impact of increased knowledge of the benefits of vitamin D on sun exposure practices?
- To what extent do people understand the UV Index? How does it affect their sun exposure and protection practices?

Section 2: Methodology

This evidence review was conducted according to the NICE public health methods guide [1]. The review was guided by a project protocol developed in close collaboration with the NICE Centre for Public Health (CPH). The protocol was developed on the basis of a NICE scope document [2] and contract of work which specified the research questions, the eligibility criteria and record selection process, the quality assessment and data extraction process, and the timelines of the project.

2.1 SELECTION CRITERIA

Studies eligible for inclusion in this review needed to meet the inclusion and exclusion criteria described below. These criteria were derived from the NICE Public Health Guidance final scope [2] and discussions with the NICE team.

The eligibility criteria were structured into three concepts:

- The perspectives of interest (Section 2.1.1);
- The research theme/design (Section 2.1.2);
- The review questions, including the barriers and facilitators (Section 2.1.3).

These are described in detail below.

2.1.1 Perspectives

To be included in this review studies needed to report the perspectives of one or more of the following populations.

The general population or specific subgroups of the general population, in particular:

- People at increased risk of skin cancer:
  - People with fair skin;
  - People with fair or red hair;
  - People with more than 50 moles or atypical moles;
  - Babies and children;
  - Outdoor workers and people whose lifestyles or leisure pursuits lead to excessive UV exposure (water sports enthusiasts or gardeners);
  - People with a family history of skin cancer.

- People at increased risk of vitamin D deficiency:
    - Pregnant and breastfeeding women;
    - Infants and young children (younger than 5 years);
    - People with dark skin, for example, people of African, African–Caribbean, Middle Eastern and South Asian origin;
    - Older people (65 and older);
    - People who have low or no exposure to the sun (for example, people who cover their skin for cultural reasons, and people who are housebound or confined indoors for long periods).
- People with different levels of education;
- People with learning disabilities;
- People with physical impairments;
- People who are non-English speaking or whose first language is not English;
- People from different religious and cultural backgrounds;
- People of different ages.

Health professionals, people working with children, journalists, parents and those with a duty of care:

- General Practitioners;
- Optometrists and dispensing opticians;
- Health Visitors;
- Pharmacists;
- School nurses;
- Cancer nurses;
- Dermatologists;
- Nutritionists;
- Teachers and other professionals working with children including nursery staff and youth group workers;
- Carers and staff in residential care homes;
- Parents;
- Journalists.

Studies featuring only the following populations were excluded as unrepresentative of individuals living in the UK (protocol amendment):

- Skiers;
- Expatriate populations.

2.1.2 Research Theme and Outcomes

Eligible studies varied according to the themes and objectives of the research:

- Reports or reviews of research evaluating the effectiveness of interventions conveying the risks of safe sun exposure, where barriers and facilitators are either the main focus of the research or are mentioned in addition to the other primary outcomes being measured;
- Reports or reviews of questionnaires, surveys or focus groups which have investigated (in relation to UV exposure) any barriers, facilitators, knowledge and understanding, judgements, decision, responses, interpretation, knowledge sources, knowledge accuracy;
- Reports or reviews of questionnaires, surveys or focus groups which have investigated the role (knowledge, confidence, practice, intentions) that professional intermediaries, including healthcare professionals and others, play in conveying complex sun exposure risk information, and their experiences in that role.

Eligible study designs included:

- Randomised controlled trials;
- Cohort studies;
- Case-control studies;
- Cross-sectional studies;
- Surveys;
- Interview studies;
- Focus group studies.

Studies were excluded if they only featured barriers and facilitators in relation to interventions that aimed to:

- Manage vitamin D deficiency;
- Manage skin cancer;
- Prevent secondary skin cancer (activities that aim to prevent a re-occurrence);
- Manage conditions that may increase the risk of vitamin D deficiency. Examples include: end-stage liver disease; renal disease; fat malabsorption syndromes such as cystic fibrosis, coeliac disease and inflammatory bowel disease; or conditions treated with drugs that affect vitamin D metabolism;
- Manage conditions that may increase the risk of skin cancer (for example, epidermolysis bullosa, Gorlin syndrome or a weakened immune system);
- Manage conditions treated with drugs that mean increased exposure to sunlight is not advised (for example, certain antipsychotic drugs);
- Assess the effectiveness of, or compliance with, indoor tanning regulations.

Studies which only reported the conduct of an intervention, without reporting outcomes of interest to this review, were not eligible for inclusion.

Case reports of less than five individuals were not eligible for inclusion.

2.1.3 Review Questions

Eligible studies were those that provided information which contributed to answering the following questions:

- Which sources do people (from all perspectives (section 2.1.1)) report that they use to gain knowledge of safe sun exposure?
- What factors might act as barriers to, and facilitators for, the effective implementation of activities aimed at optimising safe sun exposure knowledge and protection practices, as expressed by the recipients or the providers of interventions?
- What are the views and experiences of people (from all perspectives including those of health practitioners) receiving communication strategies and interventions about improving safe sun exposure knowledge and sun protection practices, which act as barriers or facilitators?
- Are there any unintended outcomes of interventions that deter people from using or seeking information about sun exposure?

The following sub-questions (or themes) were addressed:

- What are the processes whereby people form judgements about the health risks and benefits of sun exposure and how does this inform their decision making?
- What information is available on how and why people change their knowledge, beliefs, attitudes, behaviour and/or perception of the health benefits and risks of sun exposure, following interventions?
- What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices in the general population?
- How do people interpret and respond to conflicting messages in relation to sun exposure and health?
- How do people change their sun exposure practices based on an increased knowledge of the UV Index and how they understand the UV Index?

Studies reporting the following factors relevant to health care professionals and others with a duty of care (as listed in section 2.1.1) were eligible for this review:

- Do health care professionals, people working with children, journalists, parents and those with a duty of care have pre-existing and/or post intervention views, knowledge, beliefs, attitudes and perceptions of the health benefits and risks of sun exposure which act as barriers or facilitators?
- How do health care professionals, people working with children, journalists, parents and those with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?

2.1.4 Study Limits

Eligible studies were:

- Studies published in 2008 or later were prioritised for screening once the volume of studies was known (protocol amendment). Studies published between 1994 and 2008 were retained on file in case of need (protocol amendment);
- Published in English;
- Primary research studies had to have been conducted in the UK or to have reported barriers and facilitators as part of an intervention in an OECD country (protocol amendment). Systematic reviews (which might includes tudies from any country) were eligible.

Studies published as abstracts only were ineligible for inclusion and were excluded from the review.

2.2 LITERATURE SEARCHES

The search strategies capture both published and unpublished studies relevant to the review questions.

2.2.1 Bibliographic database search strategies

The searches required for this project were complex due to the nature and range of the evidence required. A single sensitive strategy was used to retrieve studies for this review question (barriers and facilitators review) and the other commissioned review on the effectiveness and cost-effectiveness of sun protection interventions. One set of records were screened for both reviews. The conceptual approach for the search strategy is described in Appendix A.

The searches were limited to publications published from 1994 to date, but only records published from 2008 onwards were screened in detail (protocol amendment). The strategy, where possible, was also limited to English-language studies only. The strategy safely removed any animal studies where possible and excluded any publication types that are unlikely to be relevant (case reports, news, historical articles, letters and commentary).

2.2.2 Electronic Databases and Websites

A range of major bibliographic databases were searched via the specified interfaces:

- ASSIA (Applied Social Science Index and Abstracts);
- CINAHL (Cumulative Index of Nursing and Allied Health Literature) (EBSCO);
- Cochrane Central Register of Controlled Trials (CENTRAL) (Cochrane Library, Wiley);
- Cochrane Database of Systematic Reviews (Cochrane Library, Wiley);
- Database of Abstracts of Reviews of Effectiveness (DARE) (Cochrane Library, Wiley);
- Embase (Ovid SP);
- Health Management Information Consortium (HMIC) (Ovid SP);
- MEDLINE and MEDLINE in Process (Ovid SP);
- PsycINFO (OvidSP);
- Social Policy and Practice (Ovid SP);
- Social Science Citation Index (Web of Knowledge);
- Social Care Online (http://www.scie-socialcareonline.org.uk/);
- NHS Economic Evaluation Database (NHS EED) (Cochrane Library, Wiley);
- EconLit (Ovid SP);
- HEED (EBSCO);
- CEA Registry (https://research.tufts-nemc.org/cear4/).

The following resources to locate unpublished studies and other grey literature were also searched:

- OAISTER(http://oaister.worldcat.org/);
- OpenGrey (http://www.opengrey.eu/);
- NICE Evidence (https://www.evidence.nhs.uk/);
- NICE webpages (http://www.nice.org.uk/);
- Public Health Observatories webpages (http://www.apho.org.uk/);
- Guidelines International Network (GIN) website (http://www.g-i-n.net/);
- National Guidelines Clearing House (http://www.guideline.gov/);
- EPPI Centre databases (https://eppi.ioe.ac.uk/cms/Default.aspx?tabid=185):
    - DoPHER;
    - TRoPHI.

Although WHOLIS (http://www.who.int/library/databases/en/) was intended to be searched, the resource was continually unavailable during the search period and so could not be used.

To identify reports from individual health authorities that have made attempts to communicate public health measures on the risks and benefits of sun exposure Google search was used, limited to NHS, local authority, Public Health Observatory and Department of Health sites using the 'site' limit. Additionally, the webpages of organisations producing guidance on sun exposure risks and benefits or undertaking research in the field of risk communication were searched or browsed.

Due to resource limitations and in agreement with NICE, reference list checking, citation searching and contacting experts was not undertaken (protocol amendment).

The search strategies are listed in appendix A.

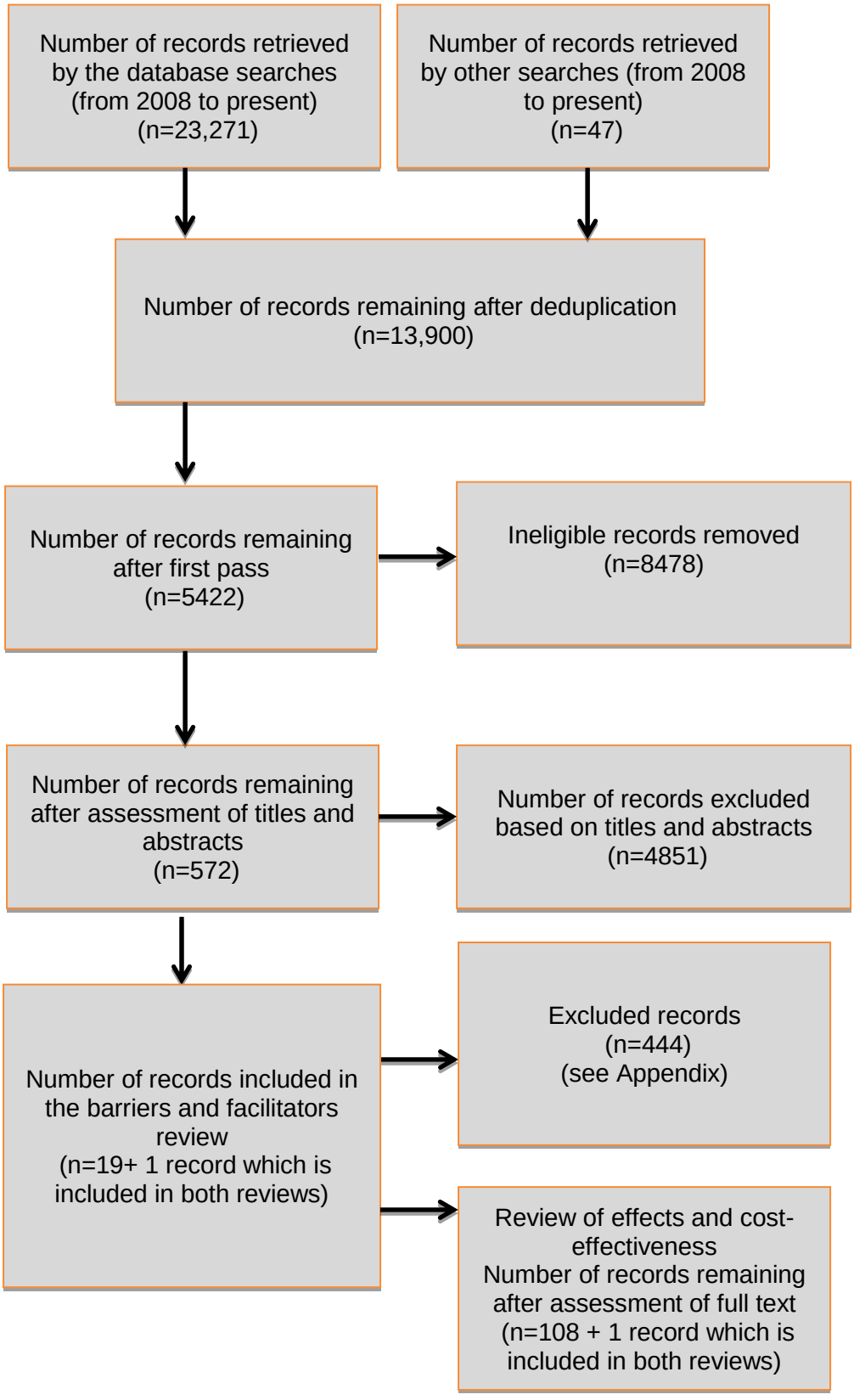
2.3 ASSESSING THE RELEVANCE OF STUDIES TO THE REVIEW

Records published since 2008 were assessed for relevance and categorised according to the selection criteria (Section 2.1). The number of records assessed at each selection stage is shown in a PRISMA flowchart (**Error! Reference source not found.**). Details of the record selection process are provided in Appendix B.

The record selection inter-rater reliability rate (IRR) was calculated by DistillerSR on an ongoing basis. Over the course of the record selection based on title and abstract the IRR was approximately 0.93. Lower rates of 0.82, 0.85 and 0.89 were calculated between reviewers over the first 100 records that each respectively reviewed. These values then rose as reviewer proficiency increased following discussion.

For the selection based on assessment of the full text the inter-rater reliability (IRR) had an overall weighted kappa of 0.57 (moderate). The studies excluded based on an assessment of the full text are listed in Appendix C.

Figure 2.1: Record selection process



2.4 STUDY SELECTION REVIEW

A review of the eligibility criteria was undertaken while the screening process was underway to ensure that the number of studies being included for further processing remained achievable within the available resources. With the agreement of NICE, several amendments to the original criteria were adopted (Table 2.1).

Table 2.1: Protocol amendments

Date of amendment	Amendment text	Protocol section number
1st April, 2014	Studies featuring only the following populations will be excluded: • Skiers; • Expatriate populations.	2.1
	Assess the effectiveness of, or compliance with, indoor tanning regulations.	2.2
	Studies published in 1994 or later. Studies published in 2008 or later will be prioritised for screening. Studies published between 1994 and 2008 will only be screened if resources permit.	2.4
	Conducted within the United Kingdom or reported as part of an intervention conducted in an OECD country	2.4
	We will then select records published in the last six years (2008-2014) to be assessed for relevance first. We will only review studies published during the period 1994-2008 if capacity permits.	3.2

Records that had already been screened were then reprocessed to ensure that they complied with the new criteria.

2.5 ASSESSING QUALITY OF STUDIES

Each study was quality assessed using the appropriate appraisal checklists from the NICE public health methods guidance [1].

The quality of systematic reviews (SRs) was assessed with the AMSTAR quality assessment tool [4] (Appendix F).

For randomised control trials (RCTs) and qualitative studies we used the quality appraisal checklist for quantitative intervention studies as per the NICE public health methods guidance [1].

The quality of the included studies was assessed by a single reviewer and checked by a further reviewer. Disagreements were resolved through consensus and where necessary a third reviewer was consulted.

The SRs were graded as ‘good quality’ if they met eight or more of the eleven AMSTAR criteria, ‘moderate quality’ if they met five to seven of the criteria and ‘poor quality’ if they met four or fewer.

The primary studies were given one of the following quality ratings:

- '++' (All or most of the checklist criteria have been fulfilled and the conclusions are unlikely to alter where the criteria has not been fulfilled);
- '+' (Some of the criteria have been fulfilled and the conclusions are unlikely to alter for the criteria that have not been fulfilled or not adequately described);
- '-' (Few or no criteria have been fulfilled and the conclusions are likely to alter).

Studies that received a '++' quality rating were referred to as 'good quality', those receiving a '+' rating were referred to as 'moderate quality' and those that received a '-' rating were referred to as 'poor quality'. Where information that could have been included was missing the denotation 'not reported/unclear' was used. If a particular criterion was not applicable to a study it was marked 'not applicable.

2.6 DATA EXTRACTION

One reviewer extracted the data from each of the included studies using a standardised template, and a second researcher checked the extraction. Any discrepancies were resolved through discussion or by consulting a third researcher. Three types of data extraction template were used based on the study type (systematic reviews, randomised controlled trials or observational studies).

For RCTs the data extraction table was based on the template presented in appendix K1 of the NICE public health methods guidance [1]. For SRs the template presented in appendix K4 was used as the basis of the data extraction table.

DistillerSR systematic reviewing software and MS Excel was used for data extraction.

2.7 DATA SYNTHESIS

2.7.1 Qualitative Data

The first stage of data synthesis was to report the qualitative data derived from studies that used focus groups, interview, surveys or questionnaires. Data are presented in tables and are summarised in the text.

Thematic synthesis was conducted using the framework of the Health Belief Model and further details are provided in Appendix B. Where studies used a conceptual model (such as a behavioural model) or underlying theory to substantiate and contextualise their evidence this is reported. For example, authors might use a conceptual model to explain why at risk groups are more or less likely to act on information relating to the risks and benefits of UV exposure and why this may or may not translate into behavioural changes or changes in practice. In addition, evidence of the reproduction of existing patterns of health inequalities in any of the reported outcomes, or any systematic difference in the outcomes between different social groups was given particular attention when the data were synthesised.

2.7.2 Quantitative Data

Data synthesis for quantitative studies incorporated narrative summaries and evidence tables and provided concise detail on: populations, intervention, settings and outcomes. Results were presented in tables and in the text by outcome. There was insufficient data available to carry out meta-analysis for any intervention.

2.7.3 Report Structure

This report sought to provide answers to the following broad question in the NICE scope:

> "What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection strategies? How does this vary by subpopulations?"

The NICE scope listed several additional questions and from this, YHEC worked together with NICE to the scope questions into specific, answerable questions that are listed in the YHEC protocol (and reported above in 2.1.3). Two additional questions about the role of professional intermediaries were requested by NICE during the development phase of the project. Because the NICE scope questions were refined and added to during the course of this project, this report is structured by the three YHEC research themes, then by the YHEC research questions (Table 2.2).

Table 2.2: YHEC research themes and YHEC research questions

NICE Scope question	YHEC research theme	YHEC research question (protocol numbering included)
From what sources do people gain their knowledge regarding safe sun exposure (for example, news media, health professionals, peers)? How do people make judgments about risk from sun exposure and how does this influence decisions about sun exposure and protection practices? What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices? To what extent do people understand the UV Index? How does it affect their sun exposure and protection practices? What has been the impact of increased knowledge of the benefits of vitamin D on sun exposure practices?	Reports or reviews of research evaluating the effectiveness of interventions conveying the risks of safe sun exposure, where barriers and facilitators are either the main focus of the research or are mentioned in addition to the other primary outcomes being measured.	2.3.1 Which sources do people (from all perspectives (section 2.1)) report that they use to gain knowledge of safe sun exposure? 2.3.5 What are the processes whereby people form judgements about the health risks and benefits of sun exposure and how does this inform their decision making? 2.3.7 What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices in the general population? 2.3.9 How do people change their sun exposure practices based on an increased knowledge of the UV Index and how they understand the UV Index? 2.3.4 Are there any unintended outcomes of interventions that deter people from using or seeking information about sun exposure?
What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices? How does this vary by subpopulations? What are people's knowledge, beliefs, attitudes and perception of the benefits and risks of sun exposure? How do people interpret and respond to conflicting messages on sun exposure and health? To what extent are they aware that messages differ according to individual risk factors?	Reports or reviews of questionnaires, surveys or focus groups which have investigated (in relation to UV exposure) any barriers, facilitators, knowledge and understanding, judgements, decision, responses, interpretation, knowledge sources, knowledge accuracy.	2.3.2 What factors might act as barriers to, and facilitators for, the effective implementation of activities aimed at optimising safe sun exposure knowledge and protection practices, as expressed by the recipients or the providers of interventions? 2.3.3 What are the views and experiences of people (from all perspectives including those of health practitioners) receiving communication strategies and interventions about improving safe sun exposure knowledge and sun protection practices, which act as barriers or facilitators? 2.3.8 How do people interpret and respond to conflicting messages in relation to sun exposure and health?

NICE Scope question	YHEC research theme	YHEC research question (protocol numbering included)
These questions were not included in the original scope, but were added to the YHEC protocol after discussion with NICE during the early stages of the project.	Reports or reviews of questionnaires, surveys or focus groups which have investigated the role (knowledge, confidence, practice, intentions) that professional intermediaries, including healthcare professionals and others, play in conveying complex sun exposure risk information, and their experiences in that role.	2.3.10 Do health care professionals and others with a duty of care have pre-existing and/or post intervention views, knowledge, beliefs, attitudes and perceptions of the health benefits and risks of sun exposure which act as barriers or facilitators? 2.3.11 How do health care professionals and others with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?

2.7.4 Evidence Statements

Evidence statements were constructed taking into account the quality and consistency of the findings and the applicability of the evidence for each of the research questions. For the purpose of generating evidence statements, the strength and consistency of evidence were considered and reported separately and evidence was described using the criteria:

- Inconclusive evidence: all poor quality studies;
- Weak evidence: at least one moderate quality study;
- Moderate evidence: either mostly moderate, or a combination or high quality and poor quality studies;
- Strong evidence: All or mostly high quality studies;
- Consistent evidence: Direction of effect is the same across studies;
- Inconsistent evidence: Direction of effect is different across studies.

Where a good or moderate quality systematic review included primary studies that were of poor quality, were heterogeneous, or did not provide sufficient detail of interventions, these reviews were downgraded.

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Section 3: Summary of Included Studies

3.1 SEARCH RESULTS

The searches returned a total of 23271 records, of which 13900 remained to be screened after deduplication. Of these, 8478 studies were excluded at the first pass stage, leaving a total of 5422 to be assessed based on title and abstract. 4851 studies were removed based on title and abstract and 572 were taken forward for full text review. 444 of these were then excluded, based on the full text, from both this review and the Effects and Cost Effectiveness review (listed in Appendix C). A further 108 studies were excluded from this review but included in the Effects and Cost Effectiveness review. This left 20 eligible studies (19 unique studies plus one study included in both this report and the Effects and Cost Effectiveness report) to be included in this review.

3.2 INCLUDED STUDIES

20 studies were included in this review: three systematic reviews (two qualitative [15, 17] and one synthesis of quantitive studies[9]), six qualitative studies [13, 18-20, 28, 29], eight quantitative studies [5-8, 10, 11, 16, 30], and three studies that used mixed methods [12, 14, 21].

All three systematic reviews included studies from OECD countries. In one systematic review six out of twenty-two included studies were from the UK, in another five out of sixteen were from the UK. The third systematic review did not report the number of studies from the UK. All of the primary research studies included in the review were conducted in the UK or an OECD country.

The studies identified for this review focus mostly on the risks of over exposure to sunlight, specifically the risk of skin cancer. Some studies report on the health benefits of sun exposure in relation to vitamin D production, but it is usually within the context of unsafe sun exposure practices and erroneous beliefs about how much sun exposure is required for vitamin D production. The evidence statements linked to each of the review questions highlight where no evidence is identified in relation to the health risks associated with UV under exposure.

It should be noted that the results from individual studies identified for this review are often relevant to more than one research question and may be reported more than once (in different parts of the report).

Summary details of the studies' characteristics are reported in Table 3.1, and detailed data are provided in Appendix D. Summary details of the quality of studies are reported in Table 3.1 and detailed quality assessments are provided in Appendix E.

Table 3.1: Characteristics of included studies

Study author, quality and type	Objectives/primary research questions.	Population and country	Number of studies or participants	Main Settings	Type of data reported
Eagle 2009 [9] Moderate [+] Systematic review	What are the effective and cost effective ways of providing information to change people's knowledge, awareness and behaviour? What content do effective and cost effective primary prevention messages contain? What is the most effective and cost effective content?	OECD countries.	50 RCTs, 11 controlled before and after studies, and 23 before and after studies.	Schools, universities, medical centres, workplaces.	Qualitative and quantitative primary studies
Lorenc *et al.* [15] Good [++] Systematic review	What factors help or hinder the provision or use of - sun protection resources; - changes to the environment (eg shelters); - multi-component interventions.	OECD countries	23 studies; interviews or focus groups.	6 in a school setting.	Qualitative primary studies
Garside [17] Good [++] Systematic review	What factors help or hinder communicaton of information about prevention of skin cancer?	OECD countries	16 studies, focus groups and / or interviews	School, university, social centre or workplaces	Qualitative primary studies
Bird and Dale, 2012 [14] Poor [-] Questionnaire	To use a UV facial scanner with beauty school students in order to increase their awareness of sun protection methods and skin cancer, and change their behaviour by adopting more safe sun habits.	Beauty school trainees students, college students and staff Devon, UK	61 beauty school trainees and 792 college students and staff.	College	Quantitative and qualitative
Bird and Dale 2011 [21] Poor [-] Questionnaire	To evaluate the impact of training community pharmacy staff to proactively approach customers on skin cancer and sun protection methods.	Pharmacies in Devon, UK	42 pharmacies.		Quantitative and qualitative

Study author, quality and type	Objectives/primary research questions.	Population and country	Number of studies or participants	Main Settings	Type of data reported
Butler *et al.*, 2013 [5] Poor [-] Survey	To identify current knowledge and awareness of and attitudes towards avoidance of skin cancer among a variety of patient groups to aid the design of future UK sun-awareness campaigns.	Patients in general practice Oxfordshire and London	1000	General practices	Quantitative
Cancer Research UK, 2008 [28] Poor [-] Focus groups; interviews	To identify motivations for seeking a tan and using sunbeds among teenagers, and factors that will deter this age group from using sunbeds, and encourage sun safe practices; investigate awareness of the link between excessive exposure to UVR and the associated health risks; explore the perceived relevance of skin cancer to this age group; identify communication channels to reach the target audience most effectively; explore ideas and options for impactful campaign formats and creative concepts.	Teenagers Not reported.	Estimated: 32 and 64.	Unclear	Qualitative
Cancer Research UK, 2008a [29] Poor [-] Focus groups; interviews	To assess knowledge, attitudes and understanding of sunburn among adults and teenagers in the UK.	Adults and teenagers. Leeds, Manchester, Bristol, North London, Sunbury.	Estimated: 152 to 216.	Unclear	Qualitative
Curtis and Pollock, 2009 [19] Poor [-] Focus groups	To explore influences on the sun exposure behaviours of girls in the UK, aged 12–15 years, and reflect on the role of the school nurse.	Two secondary schools in Nottingham.	28	School	Qualitative

Study author, quality and type	Objectives/primary research questions.	Population and country	Number of studies or participants	Main Settings	Type of data reported
Diffey and Norridge 2009 [10] Poor [-] Online questionnaire	To provide data about reported sun exposure and relate this to sun protection behaviour and attitudes towards skin cancer risk.	Sunsmart website users Location unclear	2061	UK website	Quantitative
French and Hevey, 2008 [12] Moderate [+] Think aloud methods	To find out what people think about when answering questionnaires to assess unrealistic optimism about skin cancer?	Students East Midlands	40	University	Quantitative and qualitative
Gavin *et al.*., 2011 [6] Poor [-] Interviews	To document skin cancer knowledge and trends in reported sun avoidance and sun protection behaviours.	Northern Ireland	3623	Random sample of household in Northern Ireland	Quantitative
Hedges *et al.* 2010 [7] Poor [-] Interviews	To examine the knowledge, attitude and behaviour of park users, aged 18 to 28 years, in two London parks.	Park users London	100	London public parks	Quantitative
Madgwick *et al.*., 2011 [11] Poor [-] Postal questionnaire	To evaluate socio-demographic and occupational characteristics associated with the use of sun safety measures among construction workers in Britain.	Construction workers UK	360	Construction companies	Quantitative

Study author, quality and type	Objectives/primary research questions.	Population and country	Number of studies or participants	Main Settings	Type of data reported
Mewse *et al.*., 2011 [16] Moderate [+] Questionnaire	Associations between authoritative parenting and the sun exposure and sun protective behaviours of adolescents and their friends.	School children South Wales	402	School	Quantitative
Morris *et al.*., 2011 [8] Poor [-] Interviews	To investigate the awareness and understanding of the ultraviolet index forecasts.	Residents and tourists Cornwall and Devon	466	Community	Quantitative
Nicholls *et al.*., 2009 [30] Moderate [+] Survey	To assess the quality of patient information leaflets about skin cancer and sun-protective behaviour available from general practices and community pharmacies.	General practices and community pharmacies Brighton and Hove	123	General practices and community pharmacies	Quantitative
Williams *et al.*, 2013a [13] Poor [-] Interviews; focus groups	To investigate men's experiences of taking part in an intervention showing how their faces would age with and without UV exposure.	Students UK	43	University	Qualitative
Williams *et al.,* 2012 [18] Poor [-]	To investigate women's experiences of taking part in an intervention showing how their faces would age with and without UV exposure.	Students UK	47	University	Qualitative
Williams *et al* 2013b [20] Poor [-]	To investigate adolescents' experiences of taking part in an intervention showing how their faces would age with and without UV exposure.	Adolescents UK	60	Schools in Wales	Qualitative

Section 4: The Effectiveness of Interventions Conveying the Risks of Safe Sun Exposure

This section reports results for YHEC research theme one: 'Reports or reviews of research evaluating the effectiveness of interventions conveying the risks of safe sun exposure, where barriers and facilitators are either the main focus of the research or are mentioned in addition to the other primary outcomes being measured'.

Data responding to the following YHEC research questions are reported:

- Which sources do people (from all perspectives (Section 2.1)) report that they use to gain knowledge of safe sun exposure?
- What are the processes whereby people form judgements about the health risks and benefits of sun exposure and how does this inform their decision making?
- What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices in the general population?
- How do people change their sun exposure practices based on an increased knowledge of the UV Index and how they understand the UV Index?
- Are there any unintended outcomes of interventions that deter people from using or seeking information about sun exposure?

4.1 SOURCES OF KNOWLEDGE

This section answers the YHEC research question: 'Which sources do people (from all perspectives) report that they use to gain knowledge of safe sun exposure?'

Four poor quality [-] primary studies [5-8] were identified. The systematic review included studies from several OECD countries, and the four primary studies were surveys conducted in the UK.

One poor quality survey [-] of 1000 patients (≥ 16 years and 67.3% females) presenting to their general practice in rural Oxfordshire, Oxford and central London, aimed to identify current knowledge, awareness of and attitudes towards the avoidance of skin cancer among a variety of patient groups. The survey used a convenience sample from general practice and data were collected from a self completed questionnaire. Of those who completed the survey 70% reported that the media (not defined by type) was the predominant source of information, 7% reported that their doctor was the predominant source and this rose to 15% for participants with a family or personal history of skin cancer [5].

A household survey of approximately 2000 people in Northern Ireland [6] provided more detailed information about the type of media used. The survey was conducted using face to face interviews in people's homes and those completing the survey were ≥ 16 years and households were randomly selected from addresses in the Land and Property Services Agency listing of private households. There was an approximate 1.2:1 female to male ratio and slight over-representation of older age groups relative to the Northern Ireland population, with 52% of respondents in the 2008 survey aged ≥ 45 years, compared with 45% in the mid-year population estimate. In 2008 the most commonly reported source of sun care information was television (79%) followed by magazines (52%), newspapers (49%), health professionals (35%) and family and friends (31%) [6]. Of those aged under 25 years, 20% listed the internet as a source of information compared to only 1% of those aged over 64 years. There were significant differences between males and females regarding source of information. There was a general trend for female respondents to report more exposure to skin cancer information than their male counterparts, particularly via television (82% versus 76%, P = 0.010), magazines (65% versus 39%, P < 0.001), healthcare professionals (38% versus 30%, P = 0.003), posters/leaflets (37% versus 26%, P < 0.001), pharmacies (28% versus 14%, P < 0.001) and the workplace (16% versus 9%, P < 0.001). Television, newspapers and the Internet were the most common sources of information for men.

One poor quality [-] survey study undertaken in Devon and Cornwall (251 residents and 215 tourists, 50% females) explored the awareness and understanding of global solar UV index (UVI) information presented to the public in weather forecasts. The survey enrolled a quota sample and was conducted using face to face interviews [8]. The two main sources of information about the UVI were national and local television (49% and 48% respectively).

One poor quality [-] survey study [7] was conducted using face to face interviews with a quota sample of 100 young adults (aged 18 to 28 and 56% females) in two London public parks. The aim was to examine the knowledge, attitude and behaviour of park users. The most common source of knowledge about skin cancer and skin protection was from parents and family (28%), followed by television, then magazines and newspapers (52% total). School education made up only 4% of responses.

Evidence Statement 1

There is inconclusive, consistent evidence from four poor quality studies [-][5 6-8] conducted in British adults investigating people's sources of knowledge about safe sun exposure. The main source of knowledge in all four studies was the media; this included television, magazines and newspapers. In two studies, television was the main source of knowledge, followed by magazines, then newspapers; the other two studies did not define the different media types. One study reported that women were significantly more likely than men to gain knowledge about skin cancer from all sources, and younger people under 25 years were significantly more likely to gain information about safe sun exposure from the internet than older people aged over 64. Other reported sources of knowledge were health professionals, family and friends and school education.

[5]Butler *et al.* (2013) [-]
[6]Gavin *et al.* 2012 [-]
[7]Hedges *et al.* 2010 [-]
[8]Morris *et al.* 2011 [-]

4.2 RELATIONSHIP BETWEEN THE SOURCE OF KNOWLEDGE, LEVELS OF ACCURATE KNOWLEDGE AND SUN EXPOSURE AND PROTECTION PRACTICES

This section answers the YHEC research question: What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices in the general population?

One moderate quality [+] systematic review (OECD countries) [9] and two poor quality [-] surveys conducted in the UK were identified for this question. All three studies related to the health risks associated with UV over exposure; none reported health risks associated with UV under exposure.

A moderate quality systematic review [+] reported evidence from two poor quality before-and-after studies. The first study was conducted in the US involved brochures, news conferences, interviews, public service announcements and promotional activity at a baseball game and was targeted at adults. This study focussed only on self-reported behaviour change in relation to actions to reduce the risk of skin cancer and reported significant impact ($p<0.01$) on self reported actions among those remembering communications (follow up period not specified). The second study involved delivery of television advertising to the general population (all adults) and focussed measurement of the numbers of suspicious lesions excised over time (rather than changes to sun protective behaviours). The study reported a significant increase in excised lesions during the campaign period.

One poor quality [-] survey study [7] conducted in [7] the UK held face to face interviews with 100 people aged 18 to 28 years (56% females), in two London public parks. Knowledge of sun protection methods showed that 98% of females and 93% of males strongly agreed or agreed with the statement 'sunbathing without using suntan lotion increases my risk of skin cancer'. When asked "What actions can reduce the risk of skin cancer?" sunscreen use was the most frequent response with 87 participants citing some form of sunscreen as a sun protection action. Participants were asked "what do you do to protect yourself from the sun and/or skin cancer?". Over half of the 100 respondents proposed taking only one sun protection action themselves. Sunscreen use was chosen by 89% of the participants. Only 17% of the participants' actual sun protection behaviour in the park during the interview corresponded with their response to the original question.

One poor quality [-] survey study [11] used a postal questionnaire with a convenience sample of 360 male construction workers in the UK to explore the use of sun safety measures. Results from logistic regression analyses indicated that if respondents had received sun safety training then they were more likely to cover up in the sun at work by wearing long sleeved, loose fitting tops and trousers (OR, 1.69; 95% CI: 1.02–2.80) and also sunglasses (OR, 1.85; 95% CI: 1.10–3.13). The study did not report any details about the sun safety training or who delivered it.

Evidence Statement 2

There is inconclusive evidence from one poor quality study [7] about the relationship between people's source of knowledge and levels of accurate knowledge. The study, conducted in adults in a London public park showed that while the majority of participants agreed that sunbathing without sunblock increased the risk of skin cancer, fewer participants named sunblock as a sun protection measure and approximately half of participants proposed only one sun protection measure.

There is inconclusive, inconsistent evidence from one moderate quality systematic review (containing two poor quality studies) [9] and two poor quality studies about the relationship between people's source of knowledge, and their consequent sun exposure and protection practices. One moderate quality systematic review [9] reported significant self-reported behaviour change in the sun protection practices of baseball game attendees remembering a sun protection campaign during the game in one study, and a significant number of lesions excised following a television advertising campaign aimed at the Australian general public. One poor quality study conducted in British construction workers [10] reported that participants who had received sun safety training were more likely to wear long sleeved tops and trousers (OR, 1.69; 95% CI: 1.02–2.80) and sunglasses (OR, 1.85; 95% CI: 1.10–3.13) while working in the sun. The second poor quality study conducted in a public park [7] showed that while the majority of participants agreed that sunbathing without sunblock increased the risk of skin cancer only 17% of participants had applied sunblock on the day the data was collected.

[7]Hedges *et al.* (2010) [-]
[9]Eagle *et al.* (2009) [+]
[10]Diffey *et al.* (2009) [-]

4.3 THE UV INDEX

One moderate quality [+] systematic review [9] (OECD countries) and three poor quality [-] survey studies [8, 10, 11] from the UK reported data for the YHEC research question: **'**How do people change their sun exposure practices based on an increased knowledge of the UV Index and how they understand the UV Index?' , investigating how people change their sun exposure practices based on their knowledge of the UV index. All the studies related to the health risks associated with UV over exposure and none related to the health risks associated with UV under exposure.

One moderate quality [+] systematic review [9] identified one moderate quality [+] primary study conducted in Sweden that used different combinations of brochures with or without UV radiation intensity indicators in 3200 adults from the general population and reported a significant increase in sun protection knowledge and decrease in sunbathing frequency (follow-up period unclear). A population based, random sample was randomly assigned to four groups. Each group received differentinformation packages over the summer of 2001. Before and after the summer, participants completed a questionnaire, with the compared results revealing a decrease in positive attitudes towards sunbathing as well as a drop in tanning and sunburn frequencies. All groups showed an increased level of knowledge about UV radiation and an increased use of sun protection. There were no differences between the groups. Although sun-related behaviours and beliefs changed, those participants supplied with information about the UV Index or a personal UVR intensity indicator did not show any greater decrease in sunbathing and sunburn than those participants supplied with general, written information. The study did not provide sufficient detail to enable the combination of material that may have been most effective to be identified. Additionally, there may have been contamination effects from widespread media reporting of the UV index.

Data from one poor quality [-] online survey [10] from the UK Sunsmart website were used to conduct logistic regression to investigate what factors might predispose to the use of sun protection tools in the study sample (n=1943 respondents ≥ 18 years, mean age not reported, 79% female). One-third of respondents reported using the UV index at least once or twice to plan their sun exposure (time period not specfied). Analysis showed that the use of the UV index did not appear to influence the use of (unspecified) sun protection methods ["Use UV index?" = "Yes" OR 1.17; 95% CI 0.94-1.45, p value = 0.1564]. The results should be treated with caution in terms of being generalizable to the UK population given that most of the respondents were female and between the ages of 25 and 50 years. In addition, the survey was promoted through Cancer Research UK communication channels and was therefore likely to attract an audience with a personal interest in cancer.

One poor quality [-] survey study [8] undertaken in Devon and Cornwall using face to face interviews with a quota sample (251 residents and 215 tourists, 50% females) explored the awareness and understanding of global solar UV Index information presented to the public in weather forecasts. Overall, 214 (60%) participants who had heard/possibly heard of the UV Index indicated that knowing the UV Index value did not influence their sun protection behaviour. There were significant differences between gender with more males stating such information would not influence their behaviour (70% compared with 49% females; chi square = 15.54, $p < 0.0001$); and there was no relationship between self reported perception of ease of burning in strong sun and awareness of the UVI, with more in the categories suggesting they did not burn easily in strong sun stating UV Index information would not influence their sun protection behaviour (72% 'not very easily', 64% 'not easily at all', 61% 'never'; Chi square = 18.12, df = 8, $p < 0.05$). Values were not reported for 'somewhat easily' and 'very easily'. Sixty-seven percent had heard of the UVI, however only 13% knew that the maximum value was 10 (in the UK) with 63.5% indicating that the maximum value was 17. Eight percent of participants knew the UVI value on the day of the survey. When asked what the UVI meant to them, 46% (n = 165) of all respondents indicated that they thought it meant skin damage by UV, 36% the risk of skin cancer, 35% the likelihood that the skin will get damaged and 28% the degree of sun protection required. Significantly more respondents in the 55+ age group (46%) believed the term UVI meant risk of skin cancer compared with those in the younger age groups (10% in the 16–24 group and 9% in the 25–34 group; $c2 = 19.78$, df = 3, $p < 0.0001$).

One poor quality [-] survey study [11] used a postal questionnaire with a convenience sample of 360 male construction workers in the UK to explore the use of sun safety measures [11]. Results from logistic regression analyses indicated that there was no statistically significant association between respondents having received sun safety training and checking the UV Index for the day (p=0.07).

Evidence Statement 3

There is inconclusive evidence from one poor quality study in British adults about how people understand the UV index. [8] Sixty-seven percent had heard of the UVI, however only 13% knew that the maximum value was 10 (in the UK) with 63.5% indicating that the maximum value was 17. Eight percent of participants knew the UVI value on the day of the survey.

There is inconclusive, consistent evidence from three poor quality studies [9-11] in British adults that increased knowledge about the UV index does not lead to changes in sun protection practices. No differences in sun protection practices were reported in one study conducted from the UK SunSmart website asking participants whether they used the UV index (OR (of 'yes' respondents) 1.17; 95% CI 0.94-1.45, p=0.16) [10]; one study reported that 60% of respondents stated that knowing the UV index value did not influence their sun protection behaviour [8]; the third study reported that sun safety training was not associated with check the UV index (p=0.07) [11]. One moderate quality systematic review [9] identified one primary study from Sweden showing contradictory results; a significant increase in sun protection knowledge and decrease in sunbathing frequency among adults who received information about UV radiation intensity.[9]

[9]Eagle *et al.* (2009) [-]
[11]Madgwick *et al.* (2011) [-]
[8]Morris *et al.* (2011) [-]
[10]Diffey *et al.* (2009) [-]

4.4 JUDGING THE RISK OF SUN EXPOSURE, AND HOW THIS INFLUENCES DESCISIONS ABOUT SUN EXPOSURE AND PROTECTION PRACTICES

This section reported data for the following YHEC research question: 'What are the processes whereby people form judgements about the health risks and benefits of sun exposure and how does this inform their decision making?' and identified one moderate quality qualitative study [12].

One moderate quality [+] qualitative study [12] provided information on the processes whereby young adults (40 UK university students aged 18 to 24 years, 50% female) form judgements about the health risks of sun exposure and how this informs their decision making. The study established that there was evidence of "unrealistic optimism" for the group of students as a whole based on their mean rating of skin cancer risk when completing a questionnaire that asked them about their own and other people's risk of skin cancer. Unrealistic optimism is a psychological term for the tendency for the majority of people to estimate their personal risk of being affected by an adverse event as lower than that of the average person within a defined population. The study then explored the thoughts the students had when forming their judgements about risk of skin cancer by asking them to "think aloud" as they completed the questionnaire. When considering their own risk of skin cancer directly in comparison to someone else of the same age and sex, respondents' most common thoughts were about exposure to the sun, such as using a sun bed or having holidays abroad (20/40, 50%) and personal features such as skin colouring, hair colour and genetics (14/40, 35%). Few participants considered prevalence of skin cancer in their response to any of the questions (3/40, 8%). The study concluded that people do not seem to think about numerical probabilities when estimating risk and this may at least partially explain why attempts to influence behaviour by providing probabilistic information are generally unsuccessful.

Evidence Statement 4

There is inconclusive evidence from one moderate quality [+] qualitative study [12] that UK university students do not consider numerical probabilities when estimating their skin cancer risk. Fifty percent of participants rated their risk of skin cancer as being lower than that of the average person and compared their own skin cancer risk with that of their peers by considering sunbed use and holidays abroad (50%) and personal features such as skin colouring, hair colour and genetics (35%). Eight percent of participants considered prevalence of skin cancer in their response.

[12]French *et al.* (2008) [+]

4.5 UNINTENDED OUTCOMES

This section reported data for the following YHEC research question: 'Are there any unintended outcomes of interventions that deter people from using or seeking information about sun exposure?' and identified two qualitative studies [13, 14].

One poor quality qualitative study reported men's (aged 18 to 24 years) experiences of taking part in an intervention which involved seeing how their faces would age with and without UV exposure [13]. Although the majority of men were 'shocked' at how they looked and planned to engage in sun protection practices in the future, some men reported that viewing the photographs would have no effect on their future sun protection and/or UV exposure behaviours. A number of the participants brought out positive impacts of the way that they looked in the aged photographs, citing male-appropriate appearance factors such as looking tough [13].

A second poor quality qualitative study evaluated an intervention involving training beauty therapy students and tutors in three colleges in Devon to deliver peer-to-peer mini beauty consultations, using the UV facial scanner to highlight skin type and early signs of sun damage, providing personalised advice and offering fake tan tips as an alternative way to achieve a tan. [14] The aim was to increase teenagers awareness of sun protection methods and skin cancer, and change their behaviour by adopting safer sun habits [14]. Although the majority of participants were frightened by the skin damage caused by sun exposure a number of participants reported positive thoughts after seeing the results. That is, they were pleasantly surprised at how little damage they had suffered despite risky behaviour with regard to sun exposure:

"*My skin looks better than I expected following my previous use of sunbeds and foreign holiday sun exposure*"

Evidence Statement 5

Two poor quality qualitative studies reported unintended outcomes from interventions that that aim to deter people from using or seeking information about sun [13, 14] Despite being 'shocked' and 'frightened' about seeing personalised images of sun damaged/aged skin as a result of UV exposure, participants in both studies were able to draw positive aspects about the images. Some men were pleased that the UV exposure made them look tough [13] and some women were pleased that their skin looked so good under a UV scanner despite previously risky behaviour. [14]

[13]Williams *et al.* (2013a) [-]
[14]Bird *et al.* (2011) [-]

Section 5: Barriers and Facilitators

This section reports results for YHEC research theme two: Reports or reviews of questionnaires, surveys or focus groups which have investigated (in relation to UV exposure) any barriers, facilitators, knowledge and understanding, judgements, decision, responses, interpretation, knowledge sources, knowledge accuracy.

Data responding to the following YHEC research questions are reported:

- What factors might act as barriers to, and facilitators for, the effective implementation of activities aimed at optimising safe sun exposure knowledge and protection practices, as expressed by the recipients or the providers of interventions?
- What are the views and experiences of people (from all perspectives including those of health practitioners) receiving communication strategies and interventions about improving safe sun exposure knowledge and sun protection practices, which act as barriers or facilitators?
- How do people interpret and respond to conflicting messages in relation to sun exposure and health?

Findings from qualitative research studies for this question are presented according to the framework for the Health Belief Model. Where quantitative studies are relevant to a topic within the model a summary of their findings will be presented as a separate section within that topic.

5.1 BARRIERS TO SUN PROTECTION KNOWLEDGE AND PRACTICES

This section reported data for the following research question: 'What factors might act as barriers to, and facilitators for, the effective implementation of activities aimed at optimising safe sun exposure knowledge and protection practices, as expressed by the recipients or the providers of interventions?'

5.1.1 Susceptibility to Skin Cancer

Two good quality [++] systematic reviews [15, 17] discussed perceived susceptibility to skin cancer. One moderate quality [+] study [16] and two poor quality [-] studies [19, 28, 29 5, 8, 10, 11](19, 21, 23, 25)(19, 21, 23, 25)(3-6)reported on the relationship between predisposition to sunburn and sun protection knowledge and practice, or reported on the relationship between personal or family/friend history of skin cancer and sun protection knowledge and practice.

One good quality [++] systematic review assessed qualitative evidence for sun protection resources and changes to the environment to prevent skin cancer [15]. It identified twelve primary studies that discussed perceived susceptibility to skin cancer including three identified for this review [19, 28, 29]. Most of the factors identified did not appear to vary substantially between countries. However, it is possible that people in the UK may have lower perceived susceptibility than elsewhere because of differences in climate.

Two studies in the review found that the experience of melanoma or pre-cancerous moles by participants or people they know, or a family history of malignant melanoma, increase perceived risk [15]. Five studies reported that the risk of skin cancer is not appreciated or is seen as not of immediate concern. This perception is particularly stated by children (aged 6-8 years) and young people (aged 12-25 years approximately), who view the risk as too distant to be a serious concern. One study found that fathers thought that children had a greater risk of developing skin cancer than adults because their skin is more "delicate". Three studies of adult participants report that people are aware of the risks of skin cancer, but avoid thinking about them, or adopt an optimistic framing that minimises their own perceived susceptibility, such as assuming that others' exposure to risk factors must be higher than their own. One US study discussed the communication of risks within families where a member has had an experience of skin cancer, finding that people diagnosed with cancer usually discussed risk with their families, and that women took a leading role in communication. Five studies of young people and adults report the belief that sun exposure provides "resistance" to skin damage, burning or cancer in the future. In particular, outdoor workers reported such beliefs in two studies and parents in one. Three studies identify other factors that affect perceived susceptibility to skin cancer. Two studies report the perception that a darker skin colour decreased risk level. One study in the review found that participants of higher socioeconomic status were more aware of the risks.

The second good quality [++] review [17] reviewed qualitative evidence for barriers to and facilitators to conveying information to prevent first occurrence of skin cancer. The review included four primary studies that discussed perceived susceptibility to skin cancer, one of which was from the UK. Three studies in the review reported low perceptions of susceptibility to skin cancer among children and older adults. Three study reports, among both children and adults, showed the belief that darker skin tones are protective against cancer. It was unclear from the wording of the review whether the term "darker skin tones" referred purely to skin type, or whether it also encompassed the belief that tanned skin provides protection against skin cancer.

One poor quality [-] survey [5] collected data from 1000 patients (≥ 16 years and 67.3% females) presenting to their general practice in rural Oxfordshire, Oxford and central London. Results showed that people with skin which was more at risk of burning were consistently more likely to engage in sun protection practices than those with lower risk: for example, in response to the statement "I apply sunscreen when I am in the sun for > 1 hour always/most of the time" 57.8% of those with skin type 1 (usually burns) agreed, 37.2% of those with skin type 2 (usually tans) agreed, and 12.5% of those with skin type III (never burn) agreed. Results from the same study showed that more people with a personal or family history of cancer avoided the midday sun than those without such a history (skin cancer history 58.0% vs no skin cancer history 52.7%), were more likely to wear sunscreen (cancer history 62.3%, no skin cancer history 49.6%, p value not reported) and to examine their skin more than once a year (skin cancer history 61.0%, no skin cancer history 37.9%, p value not reported). However, the study found no significant difference in the likelihood of those with a personal or family history of skin cancer covering up, compared to those without such a history (skin cancer history 47.2%, no skin cancer history 46.5%, no p value reported) and more respondents with a personal or family history of skin cancer reported getting sunburnt > 1 time／year compared with those without such a history (skin cancer history 34.1%, no skin cancer history 31.7%), although this difference was not significant (P = 0.54).

One poor quality [-] online survey [10] completed by visitors to the UK Sunsmart website (n=1943 aged >18 years, mean age not reported, 79% female) found that the strongest predictor for the use of sun protection tools (shade, sunhat, clothing and use of SPF 15+ sunscreen) was predisposition to sunburn, with people reporting melano-compromised skin (burns easily in the sun) being more than twice as likely to adopt two or more sun protection strategies as people with melano-competent skin (usually tans) or melano-protected skin (born with dark skin, does not go red): Odds Ratio 2.24 (95% CI 1.83–2.74), p < 0.0001. However, perception of skin cancer risk did not appear to influence the use of multiple simultaneous methods of sun protection: perceived risk of skin cancer high/moderate Odds ratio 1.09 (95% CI 0.87–1.37, p= 0.4329) [10].

One moderate quality [+] survey [16] of 321 children aged 13 to 17 years from one school in South Wales, found from results of regression analysis that skin type (1. Burns only, never tans 2. Burns first, then tans 3. Never burns.) was a statistically significant predictor of adolescents' sun protection behaviour (Beta = 0.11, Standard error beta = 0.03, R^2 = 0.15, p<0.01). Sun protection behaviour included sunscreen use, wearing a hat or T shirt, and seeking shade in the middle part of the day [16].

Evidence Statement 6

Evidence from one good quality [++] systematic review [15] (3 of 12 studies from the UK) and one poor quality [-] UK quantitative survey [5] in 1000 individuals, indicated that individuals with family members or friends who have experienced melanoma or pre-cancerous moles have higher perceptions of the risk of skin cancer and some take sun protection measures. However, individuals without such experience are less likely to appreciate the risk of skin cancer and this is particularly the case with young children (aged 6-8 years) and young people (aged 12-25 years approximately), who view the risk as too distant to be a serious concern. Evidence from one poor quality [-] online survey [10] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, mean age not reported, 79% female) found that perception of skin cancer risk did not appear to influence the use of multiple simultaneous methods of sun protection (perceived risk of skin cancer high/moderate odds ratio 1.09 (95% CI 0.87–1.37, p= 0.4329). There is weak consistent evidence that adults are aware of the risks of skin cancer, but avoid thinking about them, or adopt an optimistic framing that minimises their own perceived susceptibility, such as assuming that others' exposure to risk factors must be higher than their own.

There is weak consistent evidence from three UK studies to suggest a link between skin propensity to burn and sun protection behaviours. These included one poor quality [-] UK quantitative survey [5] of 1000 general practice patients (≥ 16 years and 67.3% females) where 57.8% of respondents with skin that usually burns in the sun agreed to the statement "I apply sunscreen when I am in the sun for > 1 hour always/most of the time". One poor quality [-] online survey [10] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, mean age not reported, 79% female) also found that the strongest predictor for the use of sun protection tools (shade, sunhat, clothing and use of SPF 15+ sunscreen) was predisposition to sunburn (people with skin that burns easily in the sun are more than twice as likely to adopt two or more sun protection strategies than people with melano-competent skin (usually tans) or melano-protected skin (born with dark skin, does not go red): Odds Ratio 2.24 (95% CI 1.83–2.74), $p < 0.0001$. One moderate quality [+] quantitative UK survey [16] of 321 children aged 13 to 17 years found that skin type was a statistically significant predictor of adolescents' sun protection behaviour (sunscren use, wearing a hat or T short and seeking shade in the middle of the day) (Beta = 0.11, Standard error beta = 0.03, $R^2 = 0.15$, $p<0.01$).

There is consistent evidence from two good quality [++] systematic reviews [15 17] that young people and adults may have mistaken beliefs about sun exposure, believing that it provides "resistance" to skin damage, burning or cancer in the future, and that a darker skin colour decreases risk level for skin damage and cancer. One study found that participants of higher socioeconomic status were more aware of the risks.

[15]Lorenc *et al.* (2010) [++]
[5]Butler *et al.* (2013) [-]
[10]Diffey *et al.* (2009) [-]
[16]Mewse *et al.* (2011) [+]
[17]Garside *et al.* (2009) [++]

5.1.2 Severity of Sun Exposure and Skin Cancer

Two good quality [++] systematic reviews [15, 17] discussed perceived severity of sun exposure and skin cancer, and four poor quality [-] qualitative UK studies [13, 14 18, 20] reported that people were often very seriously concerned about how sun damaged skin could affect their appearance[13, 14]. Two studies identified by this review [28, 29] and which reported this theme were also included in one of the systematic reviews [15] and so are not reported individually here.

One good quality [++] systematic review [15] included seven studies that discussed perceived severity of skin cancer. Only one of the seven studies was conducted in the UK. All other studies were conducted in the USA, New Zealand or Australia. The authors suggested that it is possible that knowledge about the severity of skin cancer may be greater in the latter countries than the UK due to previous information campaigns. Perceived severity of skin cancer was low in all studies across a wide range of age groups (aged 6 years to over 60 years), with even the Australian studies finding that most participants did not see skin cancer as a serious threat. In three of the reviewed studies participants thought that skin cancer was easy to treat [15]. In one study with participants aged 6-8 years, there was a lack of understanding about what skin cancer was or the risks of skin cancer. A study of farmers in the USA found that they did not see skin cancer affecting their day-to-day work. Seven studies reported that skin aging was seen as a serious consequence of sun exposure. Two studies found that skin aging is perceived as a more serious consequence of sun exposure than is skin cancer. Four studies report that skin aging was seen as a more serious consequence by women than it was by men [15].

The other good quality [++] systematic review [17] assessed six reports of qualitative research that discussed perceptions of the severity of skin cancer or sun exposure, two of which were from the UK. Perceived severity of sun exposure was low in children, young adults, older adults and sunbed users [17]. Children were more aware of the short term discomfort of sun exposure than long term risks. Studies in adults found skin cancer was thought to be easily cured, a possible future concern, something people preferred not to think about or outweighed by the perceived short term benefits of a tan. Four studies suggested that photo-aging was taken seriously by participants, especially women, in one case suggesting that this was perceived as a more serious and real concern than skin cancer.

One poor quality [-] qualitative study [13] from the UK used an appearance-focussed facial-ageing sun protection intervention with 43 male university students aged 18 to 34 years which involved showing them computer generated pictures of how their faces would age with and without UV exposure [13]. The majority of participants (n=30) expressed shock when seeing the effect of UV exposure on their skin: for example, through the use of words such as “God”, “wow”, and “urgh”. A number of the men gave emotional responses to viewing the images: for example reacting to the images with disgust and concern using words like “disgusting” and “horrible”. All of the participants could see a difference between the two photographs, with the majority of participants reporting that the sun-aged image was significantly more UV-damaged than the non sun-aged image. However as previously discussed in this report, a number of men (number unspecified) felt that the effects of UV exposure were male-appropriate, making them look “weathered” or “tough”. The main differences that the participants could see were in terms of wrinkling and colour, for example:

> “I mean the amount of wrinkles on the right [UV-aged] is just phenomenal compared to the left [non UV-aged]” (Freddie, 34)[13]

In a poor quality [-] qualitative study [18] conducted by the same research team, an appearance-focussed facial-ageing sun protection intervention was conducted with 47 female university students aged 18 to 34 years in the UK. The women were shown computer generated pictures of how their faces would age with and without UV exposure [13]. All of the participants (n=47) expressed shock when seeing the effect of UV exposure on their skin and many gave emotional responses to viewing the images: for example reacting to the images with disgust and concern using words like “disgusting” (n=6) and “horrible” (n=11). All of the participants could see a difference between the two photographs and many were concerned about the results mentioning wrinkling (n=34), spots (n=30) and sagging (n=13). All of the women said that the photos would have an impact on their future sun protection and UV exposure behaviour [18].

In a further poor quality [-] qualitative study [20] conducted by the same research team, an appearance-focussed facial-ageing sun protection intervention was conducted with 60 adolsecents (50% female) mean age 12.58 in Wales. The adolescents were shown computer generated pictures of how their faces would age with and without UV exposure in a focus group setting [13]. All of the participants (n=60) expressed shock when seeing the effect of UV exposure on their skin and many gave emotional responses to viewing the images: for example reacting to the images with disgust and concern using words like “urgh” (n=37) or “oh my God” or “oh God” (n=35). All of the participants could see a difference between the two photographs and the majority (n=57) thought the UV-aged photo looked more negative than the unaged phot. Many were concerned about the results mentioning wrinling, spots and sagging.. The majority of adolescents said that the photos would have an impact on their future sun protection and UV exposure behaviour

One poor quality [-] mixed methods UK study [14] used a facial imaging intervention with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon with the aim of preventing skin cancer. The intervention involved training beauty therapy students and tutors to deliver peer-to-peer mini beauty consultations, using a UV facial scanner to highlight skin type and early signs of sun damage, providing personalised advice and offering fake tan tips as an alternative way to achieve a tan. After the training session and in response to the question “What had the most impact on you during the session: i.e what will you remember the most?” the beauty therapy students’ comments were as follows:

> “Seeing myself under the UV - seeing how many freckles!; Actually looking at faces through the scanner and talking through what was seen; The results from my scanner image. Made me more aware; The pictures of burnt/aged skin; Seeing pics of damaged skin; Nickys talk about her experience of skin cancer ; Affects all skin types; Different skin types and how they are recognised; That getting badly burnt once every 2 years triples your chance of getting skin cancer; The way that skin cancer can develop from sunburn; How quickly it damages your skin; How bad the sun is for your skin if you stay out too long in it; The scars - you still get scars etc; Sunbeds are bad but I already knew that; and, the long term effects of skin cancer “
> (Source: Bird, 2011)[14].

Evidence Statement 7

There is moderate evidence from one good quality systematic review [15] that perceived severity of skin cancer can act as a barrier to sun protection practices. Perceived susceptibility of skin cancer was low in all studies across age groups; the majority of participants did not view skin cancer as a serious threat.

There is strong evidence from one good quality systematic review [17] and three poor quality studies [13, 14, 18] that perceived susceptibility of sun exposure can act as a barrier to sun protection behaviours. Perceived susceptibility to sun exposure in terms of developing skin cancer was low across studies, however skin aging was seen to be a serious consequence of sun exposure.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]
[18]Williams *et al.* (2012) [-]
[13]Williams *et al.* (2013) [-]
[14]Bird *et al.* (2011) [-]

Findings from Quantitative Studies

Age and gender

Five poor quality [-] UK survey studies [5-7, 10, 11] assessed the relationship between a person's age and/or gender and their sun protection practices.

One poor quality [-] online survey [10] completed by visitors to the UK Sunsmart website (n=1943 aged >18 years, 79% female) found that the strongest predictor for recent sunburn was age, with people under 35 years of age being 2.34 times more likely to report recent sunburn than older people ($p<0.0001$) [10].

One poor quality [-] survey [5] of 1000 patients (≥ 16 years and 67.3% females) presenting to their general practice in rural Oxfordshire, Oxford and central London collected data from a convenience sample of patients via a self completed questionnaire. They found that patients aged 16-30 were significantly less likely to avoid the midday sun compared to older people (16-30 = 35.9%, 31-45=56.1%, 46-60=59.9%, >60=67.0%, $p<0.001$); and those aged 16-30 were significantly less likely to wear protective clothing always or most of the time (16-30 = 30.8%, 31-45=49.1%, 46-60=54.9%, >60=56.7%, $p<0.001$) [5]. The study also reported that people aged 16–30 years were significantly less likely to wear sunscreen 'always/most of the time' when in the sun for over one hour compared with those aged 31–45 years (44.6% vs. 57.7%, $p < 0.01$). A significant difference was also seen when comparing those aged 16– 30 years with those aged 46–60 years (44.6% vs. 54.1%, $p=0.05$) and with > 60 years (44.6% vs. 47.9%, $p=0.51$) [5]. With regard to gender the study found that women were significantly more likely than men to wear sunscreen (57.4% vs. 38.6%, $p < 0.001$).

One poor quality [-] household survey [6] of approximately 2000 randomly selected people (≥ 16 years) in Northern Ireland, found that use of sun avoidance as a method of sun protection was proportional to age [6]. For example, in 2008, 2% of respondents aged 16-24 reported never going out in the sun compared to 16% of those aged > 64 years. In the 16-24 age group 13% of respondents reported avoiding the midday sun, compared to 25% in the 25-44 age group, 27% in the 45-64 age group and 27% in the > 64 age group. Younger respondents (aged 16–24 years) were less likely than those aged ≥ 25 years to report never going out in the sun (p=0.015), avoidance of the mid-day sun (p=0.004), staying in the shade (p<0.001) or wearing a hat (p<0.001) (numbers or percentages of respondents not reported). Overall use of sunscreen was reported to be similar across the different age groups: 73% for those aged < 25 years, 77% for those aged 25-44, 73% for those aged 45-64 and 48% for those aged > 65 years. However, this contrasts with reported sunscreen use while sunbathing abroad: 1% for those aged < 25 years, 84% for those aged 25-44, 69% for those aged 45-64 and 54% for those aged > 65 years, and reported sunscreen use while sunbathing at home: 0% for those aged < 25 years, 53% for those aged 25-44, 42% for those aged 45-64 and 38% for those aged > 65 years. Given that overall sunscreen use was reported as 73% for those aged < 25 years, yet reported sunscreen use abroad is 1% and at home 0%, this appears to be a reporting error. The study reported percentages only and did not report the number of respondents within each age group. The percentage of sunscreen users who reported using at least SPF15 was reported to be 71% for those aged ≥ 25 years and 65% for those aged < 25 years. In relation to gender women were reported to be more likely to wear sunscreen than men (76% vs. 63%, p<0.001). When sunbathing abroad the numbers were similar (75% of women and 73% of men), but when sunbathing at home women were more likely to use sunscreen (51% vs. 37%, p<0.001). In addition, study results reported that women were: more likely to never go out in the sun (11% vs. 6%, p=0.002); more likely to avoid the midday sun (30% vs 19%, p<0.001); more likely to stay in the shade (29% vs. 18%, p<0.001); just as likely to cover up as men (23% for both men and women); less likely to wear a hat (28% vs. 37%, p=0.001); and more likely to conduct regular skin checks (9% vs. 6%, p=0.05).

One poor quality [-] survey study [11] used a postal questionnaire with a convenience sample of 360 male construction workers in the UK to explore the use of sun safety measures. Results from logistic regression analysis found that covering up in the sun, by wearing long sleeved loose fitting tops and trousers (OR, 1.03; 95% CI, 1.01–1.05) was positively associated with age. No further details about how the age variable was included in the model were reported.

One poor quality [-] UK survey study [7] was conducted using face to face interviews with a quota sample of 100 young adults (aged 18 to 28 and 56% females) in two London public parks. Results showed that the oldest age group (25–28 years) cited more barriers to using sun protection methods overall, mostly in respect to sunscreen use, followed by barriers to wearing hats. The main concern for this age group was cosmetics and comfort. The 21–24 years age group's main concern with use of sun protection methods was convenience, and the youngest age group cited few barriers with no overwhelming distinct type of barrier. In terms of gender, males cited convenience over cosmetic (females) as the primary barrier to use of sun protection methods; followed by males having concern over expense (sunscreen) and females over other non-descript barriers, such as weather conditions not requiring sun protection methods to be used [7]. With regard to gender, the study reported that women used sunscreen more than men, and that the higher sun protection factor sunscreen (exact SPFs not specified) was being used more frequently by females (no data reported) [7].

Evidence Statement 8

There is weak consistent evidence from four poor quality UK studies that younger people are more likely to experience sunburn, and less likely to avoid the midday sun, wear protective clothing or wear sunscreen when in the sun than older people. A poor quality [-] online survey [10, 14] completed by visitors to the UK SunSmart website (n=1943 aged >18 years, 79% female) reported that people under 35 years of age were 2.34 times more likely to report recent sunburn than older people ($p<0.0001$). A poor quality [-] survey [5] of 1000 UK general practice patients (≥ 16 years and 67.3% females) found that patients aged 16-30 were significantly less likely to avoid the midday sun compared to older people (e.g. age 16-30 = 35.9% and age 46-60=59.9%, $p<0.001$); those aged 16-30 were significantly less likely to wear protective clothing always or most of the time (e.g. age16-30 = 30.8% and age 46-60=54.9%, $p<0.001$); those aged 16–30 years were significantly less likely to wear sunscreen 'always/most of the time' when in the sun for over one hour compared with older people (e.g. age 16-30 = 44.6% and age 46–60 = 54.1%, $p=0.05$). A poor quality [-] household survey [6] of approximately 2000 randomly selected people (≥ 16 years) in Northern Ireland, found that younger people are less likely to engage in sun protection practices compared to older people in terms of avoiding the midday sun. A poor quality [-] survey study [11] with a convenience sample of 360 male construction workers found that covering up in the sun by wearing long sleeved loose fitting tops and trousers (OR, 1.03; 95% CI, 1.01–1.05) was positively associated with age.

[14]Bird *et al.* (2011) [-]
[5]Butler *et al.* (2013) [-]
[11]Madgwick *et al.* (2011) [-]
[6]Gavin *et al.* (2012) [-]

Evidence Statement 9

There is weak consistent evidence from three poor quality studies that men and women behave differently in terms of sun protection practices. One poor quality [-] survey [5] of 1000 general practice patients (≥ 16 years and 67.3% females) in the UK, found that women were significantly more likely than men to wear sunscreen (57.4% vs. 38.6%, $p < 0.001$). One poor quality [-] household survey [6] of approximately 2000 randomly selected people (≥ 16 years) in Northern Ireland, found that women were more likely to wear sunscreen than men (76% vs. 63%, $p<0.001$). Women were: more likely to never go out in the sun (11% vs. 6%, $p=0.002$), more likely to avoid the midday sun (30% vs 19%, $p<0.001$), more likely to stay in the shade (29% vs. 18%, $p<0.001$) and more likely to conduct regular skin checks (9% vs. 6%, $p=0.05$) than men. However, women were just as likely to cover up as men (23% for both men and women) and less likely to wear a hat (28% vs. 37%, $p=0.001$). In a poor quality [-] UK survey study [7] using face to face interviews with 100 young adults (aged 18 to 28 and 56% females) in two London public parks men cited convenience over cosmetic issues (females) as the primary barrier to use of sun protection methods. Men were concerned over expense (sunscreen) and females over other barriers, such as weather conditions not requiring sun protection methods to be used[7]. Women used sunscreen more than men, and higher sun protection factor sunscreen (exact SPFs not specified) was being used more frequently by females (no data reported) [7].

[5]Butler *et al.* (2013) [-]
[6]Gavin *et al.* (2012) [-]
[7]Hedges *et al.* (2010) [-]

Appearance-focussed intervention

One poor quality [-] mixed methods (structured questionnaire survey and free text comments) UK study [14] used a facial imaging intervention with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon with the aim of preventing skin cancer. The intervention involved training beauty therapy students and tutors (n=66) to deliver peer-to-peer mini beauty consultations, using a UV facial scanner to highlight skin type and early signs of sun damage. Evaluation results for the trainees (n=51 respondents, all female) were gathered on a scale of 1 to 7 with lower scores reflecting less knowledge: the mean rating for knowledge about how to protect skin from overexposure to UV light was 5.3 before and 6.2 after the training. Mean ratings for how to identify skin types was 4.5 before and 5.9 after the training. The mean rating for confidence in advising clients about skin cancer prevention was 3.9 before and 5.6 after the training. No p values were reported. The UV scanner proved to have the most impact in the training session (35% of respondents) followed by visual media such as the pictures and video (18% of respondents). The study reports that there were no statistical differences between any of the categories and p values were not reported [14]. The trainees were asked "If as a result of this training session, you are planning to change your sun habits, please comment here." Most of the comments (73%) mentioned increased use of sunscreen compared to 9% who mentioned covering up. This was despite, during each training session, the teacher emphasizing that sunscreen was the least important form of protection and should not be used as an alternative to seeking shade and covering up [14].

Study participants (665 'before' respondents and 483 'after' respondents) were asked before the intervention "What actions do you take to protect yourself in the sun at the moment?" and after the intervention "What actions do you intend to take now to protect yourself in the sun?"

The before and after responses, respectively were as follows: Spend time in the shade move out of the sun around midday/ between 11am and 3pm (19% vs 29%); cover up (18% vs 24%); avoid sunburn (29% vs. 41%); use high factor sunscreen (factor 15+) (42% vs. 64%); reduce time spent in the sun (18% vs. 25%); check skin for moles and changes (17% vs. 23%); avoid sunbeds (41% vs. 39%); and no actions (20% vs. 9%). Numbers and p values were not reported. All of the "after" results indicated that respondents intended to take action to protect themselves from the sun as a result of the intervention, with the exception of "avoid sunbed" where results indicated that fewer people intended to avoid sunbeds as a result of the intervention. Before the intervention participants were asked "What factor sunscreen do you usually use in the UK?" and after the intervention "What factor sunscreen do you intend to use now?". The percentage of respondents who chose SP 15 or above was 51% before and 66% after the intervention.

Planned sunbed use was assessed for those who had never used sunbeds before. In response to the following statement: "I have never used sunbeds and never intend to." 71% chose this option before, compared to 74% after the intervention, and "I have never used sunbeds but may do in the future." 14% chose this option before, compared to 12% after the intervention. Planned sunbed use was assessed for those who had used sunbeds before. For the statement: "I have used sunbeds in the past but will not in the future." 5% chose this option before, compared to 6% after the intervention; and for the statement "I have used sunbeds in the past and may do in the future." 7% chose this option before, compared to 6% after the intervention; and "I have used sunbeds in the past and will continue to do so in the future." 3% chose this option before, compared to 2% after the intervention. Study participants were asked "On a scale of 1 to 7, where 1 is "not at all" and 7 is "a lot", how much have the following made you want to protect your skin from the sun in the future?" The fixed list of items was as follows: using the UV scanner (mean score = 4.6); getting personal advice (mean score = 4.2); and tips on fake tan application (mean score= 3.4).

However, there were some unintended consequences as a result of the intervention. Study participants included free text comments as part of the evaluation as follows: "It was a good experience but because i had healthy skin with after seeing it in the UV scanner it didnt really make me change my ways - but very useful!"; "My skin looks better than I expected following my previous use of sunbeds and foreign holiday sun exposure."; "I'm surprised how little sun damage I have."; and "very informative to know i have near perfect skin."

Evidence Statement 10

There is weak evidence from one poor quality [-] mixed methods UK study [14] that training and a facial imaging intervention (UV facial scanner to highlight skin type and early signs of sun damage) can improve some sun protection knowledge and intentions in students (n=600) and trainee beauticians. The study involved 600 teenage students aged 15 to 19 (60% female) and beauty school trainees (n=51) in Devon. Trainees (all female) reported increases in knowledge about how to protect skin (5.3 before vs. 6.2 after); increase in knowledge about how to identify different skin types (4.5 before vs. 5.9 after); and increase in confidence in advising about skin cancer (3.9 before vs. 5.6 after) (No p values were reported). However, knowledge acquisition can be selective as evidenced by the 73% of trainees who said they would increase use of sunscreen compared to 9% who mentioned covering up, despite teachers emphasizing that sunscreen was the least important form of protection. The study demonstrated small increases in many knowledge areas and sun protection intentions, but numbers and p values were not reported.

[14]Bird *et al.* (2011) [-]

Role of adolescents' parents, friends' parents and friends in sun protection practices

One moderate quality [+] survey study [16] from the UK collected data from 402 school children aged 13 to 17 (51% females) to examine the relationship between sun exposure and sun protective behaviours of adolescents and their friends as well as the role played by parents. Results from logistic regression analysis showed that parental authoritativeness (parents who convey both above average levels of supportiveness, and exercise above average levels of behavioural control) in the adolescents' own homes was an important predictor of adolescent use of sun protection: R2 adj value of 0.55 was significantly higher in Model 2 which included this variable (F change (1,311)=23.41, p<0.001), than in Model 1 (R2 adj =0.52) [16]. Comparisons of the models for sun protection also confirmed that friends' parents' authoritativeness was an important predictor of adolescents' use of sun protection: the R2 adj value of 0.56 was significantly higher in Model 3 which included this variable, than in Model 2 (F change (1,310)=4.67, p<0.05). Comparison of the models for sunbathing behaviour confirmed that friends' parents' authoritativeness was not an important predictor of adolescents' sunbathing behaviour: the R2 adj value of 0.24 was not significantly higher in Model 2, which included this variable (F change (1,337)=2.40, p<0.05), than in Model 1 (R2 adj =0.24) [16]. The authors concluded that parental authoritativeness was positively associated with adolescents' use of sun protection, even after the effects of other familial and peer variables were controlled, but not with the time spent sunbathing which was associated with friends' behaviours [16].

Evidence Statement 11

There is weak evidence from one moderate quality [+] survey study [16] from the UK of 402 school children aged 13 to 17 (51% females) that parental authoritativeness (parents who convey both above average levels of supportiveness, and exercise above average levels of behavioural control) in the home is an important predictor of adolescent use of sun protection: R^2 adj value of 0.55 was significantly higher in Model 2 which included this variable (F change (1,311)=23.41, p<0.001), than in Model 1 (R^2 adj =0.52).

Friends' parents' authoritativeness was also an important predictor of adolescents' use of sun protection: the R^2 adj value of 0.56 was significantly higher in Model 3 which included this variable, than in Model 2 (F change (1,310)=4.67, p<0.05) but friends' parents' authoritativeness was not an important predictor of adolescents' sunbathing behaviour: the R^2 adj value of 0.24 was not significantly higher in Model 2, which included this variable (F change (1,337)=2.40, p<0.05), than in Model 1 (R^2 adj =0.24) leading to the conclusion that time spent sunbathing was associated with friends' behaviours.

[16]Mewse *et al.* (2011) [+]

5.1.3 Institutional Policies

Two good quality [++] systematic reviews [15, 17] were identified that discussed structural challenges as perceived barriers to sun protection practices. Two primary studies [19, 28] that were identified in this review had been included in one of the systematic reviews [15], and are not discussed further in this section. One moderate quality [+] study from the UK conducted a survey of the quality and accuracy of information leaflets about skin cancer and sun-protective behaviour [30].

One good quality [++] systematic review [15] included two studies that interviewed school staff concerning the perceived barriers faced by schools in implementing and encouraging sun protection practices [15]. The studies were conducted in the USA and New Zealand. One study reported potential institutional barriers to sun protection in schools, including: the cost of implementing new policies for schools; time constraints on school staff; the difficulty of changing outdoor structures to provide shade; concerns about liability (in the event of an allergic reaction to sunscreen, for example); and the need for staff training. Two studies found that some school staff felt that sun protection was not a high-priority issue, because of the limited time children spent outdoors. Participants in one study felt that sun protection detracted from teaching and in one other study, school staff said they felt overwhelmed with policies and initiatives on a wide range of issues. Effective communication with parents was identified as a potential barrier in one study. The cost to parents was also mentioned as a concern relating to compulsory hat regulations in one study. None of the studies was conducted in the UK, and due to differences in school governance and funding systems between countries, the findings may not be readily applicable to the UK.

A second good quality [++] systematic review [17] included three studies that related to protecting children from the sun in schools. The studies were conducted in the USA and Australia. One study suggests a willingness to ensure scheduled outdoor activities don't take place at the hottest time of day, but two studies note there is limited ability to change scheduling around lunchtime. Provison of shade outside was seen as a possible improvement, although this was costly and not always easy to use by pupils.

One moderate quality [+] survey study [30] from the UK, investigated the quality and accuracy of patient information leaflets about skin cancer and sun-protective behaviour that were returned (n=31) from community pharmacies and general practices in one Primary Care Trust [30]. Readability was assessed using the SMOG (an acronym derived from Simple Measure of Gobbledygook) scoring system. Presentation and content were reviewed using the Ensuring Quality Information for Patients (EQIP) guidelines. Three consultant dermatologists assessed each leaflet for accuracy. Thirteen (42%) were published in the previous 2 years, but 10 (32%) were over 5 years old. Nine (29%) leaflets were produced by the NHS or Health Education Authority, and 8 (27%) were linked to a commercial organization. One leaflet had readability in the primary education range (SMOG score = 6), and none with the recommended range for health education material (SMOG score ≤ 5). Two leaflets (6%) were in the highest quartile of EQIP score for presentation and content. Five leaflets (17%) had a major inaccuracy such as over-reliance on sun screen products instead of shade and clothing. The authors' conclusions were that leaflets were of variable quality in presentation and content, all required a reading age higher than recommended, and all leaflets with major inaccuracies had links with commercial organizations. The results raised important issues about the potential conflict between marketing and health messages in the way sun creams are promoted [30].

Evidence Statement 12

There is strong, consistent evidence from two systematic reviews (one identifying two studies [15] and one identifying three studies [17] that institutional policies may cause barriers to sun protection practices. Schools expressed concern regarding the cost of implementing new policies and about liability (in the event of an allergic reaction to sunscreen, for example). Effective communication with parents was identified as a potential barrier and the cost to parents was also mentioned as a concern relating to compulsory hat regulations. Staff were willing to ensure that scheduled outdoor activities don't take place at the hottest time of day, but it was notes that there is limited ability to change scheduling around lunchtime

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

5.1.4 Positive Perceptions of a Tan

Two good quality [++] systematic reviews [15, 17] reported on positive perceptions of a tan. Three primary qualitative studies [19, 28, 29] were also identified but were included in one of the systematic reviews [15], and are not discussed further in this section. Three poor quality [-] survey studies from the UK included questions about positive perceptions of a tan [7, 11, 14].

One good quality [++] systematic review [15] reported that a tanned appearance was seen as attractive or aesthetically pleasing by participants in twelve studies. Conversely, white skin was viewed as unattractive in three studies, with participants using terms such as "*ugly*" and "*pasty*" to describe untanned skin. Although only two studies reporting a positive perception of a tanned appearance were conducted in the UK these perceptions appeared to be consistent across countries. Twelve studies reported positive perceptions of a tanned appearance, i.e. that a tanned appearance is perceived as attractive. Two studies reported that a tanned appearance increases confidence and self-esteem. Three studies reported that the degree of tan colour was important in shaping perceptions of tanned appearance, with a deep tan not necessarily seen as desirable. Nine studies found that a tanned appearance was seen as healthy. Of these, three studies noted that a tanned appearance indicates an active, outdoors lifestyle [15].

A second good quality [++] systematic review included nine qualitative study reports that showed that tanned skin was regarded positively [17]. Three of these studies were from the UK. Nine studies reported that tanned skin was regarded as healthy (in contrast to untanned, white skin, which is seen as unhealthy), attractive, endorsed by peers and a key symbol of a good holiday. Seven study reports showed that tanned people are seen as healthy by children, adolescents and adults. Three study reports (from Scotland, Australia and Canada) described negative associations with white, untanned skin, which was described as unhealthy and indicative of being unfit. Seven study reports, among children, adolescents and adults, describe tanned skin as being physically attractive. Two studies thought that bad skin and acne were cleared up by UV exposure. Peers are reported as an important influence on UV exposure in three studies among adolescents and sunbed users as they may react positively to tans. Two UK study reports show that a tan signifies a good holiday, especially a holiday abroad, and could be seen as a necessary "symbolic souvenir".

One poor quality [-] UK survey study [14] used a UV scanner facial imaging intervention to highlight skin type and early signs of sun damage with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon. When asked to respond to the statement "Having a tan is important to me." 8% of study participants chose "Strongly agree" before the intervention and 7% after the intervention; 31% chose "Agree" before and 27% after; 35% chose "Neither agree nor disagree" before and 36% after; 19% chose "Disagree" before and 21% after; and 8% chose "Disagree" before and 21% after. The study reported no significant difference between before and after percentages. No p values were reported.

One poor quality [-] UK survey study [7] was conducted using face to face interviews with a quota sample of 100 young adults (aged 18 to 28, 56% females) in two London public parks. Participants were asked if 'a suntan makes [them] look more attractive'. There was a strong positive response, higher in females (93%) than males (73%). The only negative response came from skin type I participants (no numbers reported). Participants were asked if they considered a suntan made them look healthier. In total, 91% of females and 75% of males strongly agree or agree that a suntan makes them look healthier. The study reported that seeking a tan was intentional behaviour undertaken by 62% of the participants. Females (71.4%) were more likely to seek a tan in comparison to males (50%). The preference for tanning was by sunbathing (68%), followed by fake tan (23%) where exposure to UV light is not required, and lastly sun beds (9%) [7].

One poor quality [-] survey study [11] that used a postal questionnaire with a convenience sample of 360 male construction workers aged 18 to 66 years [mean age 41.1; SD, 11.8] in the UK reported that 73% expressed a desire to have a suntan [11].

Evidence Statement 13

There is strong, consistent evidence from two good quality systematic reviews [15 17] and three poor quality studies [7, 11, 14] that positive perceptions of tanned skin can act as a barrier to sun protection practices. All included studies reported that a tanned appearance was seen as healthy, attractive and/or aesthetically pleasing by participants while white skin was viewed as unattractive with participants using terms such as "*ugly*" and "*pasty*" to describe untanned skin.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]
[14]Bird *et al.* (2011) [-]
[11]Madgwick *et al.* (2011) [-]
[7]Hedges *et al.* (2010) [-]

5.1.5 Routes to Tanning

One good quality [++] systematic review [15] reported eight studies, three of which were from the UK, in which people distinguished between different ways in which they could get a tan [15]: deliberate compared with incidental tanning; and sun exposure compared with sunbed use. Because of climatic differences, findings regarding incidental tanning may not be readily applicable to the UK context. Participants in three studies distinguished deliberate from incidental tanning, and expressed the belief that incidental tanning was less dangerous or less likely to require protection. One study found that participants preferred to see themselves as tanning incidentally, rather than deliberately. This may be because deliberate tanning has "unhealthy" connotations but incidental tanning from outdoor activities does not.

Three studies compared sunbed use to sun exposure. Most of the participants in these studies believed that sunbeds were more dangerous than sun exposure [15].

A second good quality [++] systematic review [17] included seven studies that reported on positive perceptions of being outdoors. One of these studies was from the UK. "Incidental tanning", obtained by simply being outdoors, was seen positively in all seven studies, for both children and adults. Such attitudes to this incidental sun exposure, makes sunscreen use less likely on overcast days, in the winter, and for children when going out to play somewhere other than the beach or for a shorter time than the whole day. One of the studies in the review concludes that people in the UK may be more likely to use sunscreen on holiday abroad than when at home.

Evidence Statement 14

There is strong, consistent evidence from two good quality systematic reviews, (one identifying eight studies [15] and one identifying seven studies [17] that incidental tanning (i.e. tanning from carrying out activities outdoors) was less dangerous and less likely to require sun protection compared with deliberate tanning which was viewed as unhealthy.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

5.1.6 Social Barriers

One good quality [++] systematic review reported ten studies (two from the UK) that referenced social barriers to using sun protection resources, such as protective clothing and sunscreen [15]. Because most of the studies were carried out outside the UK it is unclear to what extent the findings are generalisable. However, the authors stated that there is no specific reason to think that the social barriers identified are not applicable to the UK.

Six studies in the review identified the unfashionable or unattractive appearance of sun protective clothing as a barrier to their use among children and young people (aged 6-20). Two studies find that protective clothing, such as hats, would be more acceptable if they were fashionable and attractive. Three studies found that young adult and adult participants see sun protection behaviour as not strongly supported by social norms within their communities. Five studies described a strong association between sunscreen use and particular contexts, such as the beach and being on holiday. One study found that young people (ages 12-17 years) see media messages and parental behaviours regarding sun protection as focused on young children and not relevant to themselves. One study found that men see sunscreen use as unmasculine.

Evidence statement 15

There is strong evidence from one good quality [++] systematic review [15] that included ten studies, two of which were from the UK, that a barrier to the use of sun protective clothing among children and young people (aged 6 to 20) is its perception as unfashionable or unattractive. Adults reported that sun protection was not strongly supported by social norms and that sunscreen use has a strong association with particular contexts such as being on holiday. Young people (aged 12 to 17) see media messages and parental behaviours regarding sun protection as focused on young children and not relevant to them; and some men see sunscreen use as un-masculine.

[15]Lorenc *et al.* (2010) [++]

5.1.7 Perceived Health Benefits

One good quality [++] systematic review [15] and one moderate quality [+] systematic review [9] discussed the perceived health benefits of sun exposure.

One good quality [++] systematic review [15] included seven primary studies that discussed the perceived health benefits of sun exposure, one of which was conducted in the UK. Three studies reported the belief that ultraviolet exposure (it is unclear whether this refers to sunlight and/or artificial sources of UV light) is beneficial in terms of vitamin D production; two studies reported that sun exposure is believed to protect against future skin damage or cancer by increasing "resistance"; three study reports discuss the perception that outdoor activities which involve sun exposure are healthier (not defined) than indoor activities, both among adults and children. One study discussed as part of the review, found that this perception was linked to the freedom for children to play actively. Only one study was conducted in the UK. The authors state that it is unclear whether perceptions of the health benefits of sun exposure are generalisable between countries.

One moderate quality [+] systematic review [9] included one primary study that reported on the perceived health benefits of sun exposure, specifically the production of vitamin D. The large-scale survey study of Queensland residents found significant increases since 2004 in the percentage of the population believing that the use of sun protection creams increases the risk of vitamin D deficiency and that vitamin D helps prevent cancer. Many respondents also significantly overestimated the amount of sunlight needed to maintain healthy vitamin D levels. The authors of the Queensland study suggest that misconceptions regarding vitamin D and sun exposure may influence people to reduce existing sun protection behaviours [9].

Evidence Statement 16

There is strong, consistent evidence from two systematic reviews, one of good quality (identifying seven studies) [15] and one of moderate quality (identifying one primary study) [9] that perceived health benefits, specifically regarding the benefits of vitamin D exposure, can act as a barrier to sun protection practices. Additionally, sun exposure was thought to increase the skins protective qualities against future sun damage by increasing resistance.

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

5.1.8 Limits of Adult Responsibilities

One good quality [++] systematic review [17] included nine study reports of qualitative research [17] that discuss the limitations of parental responsibility for protecting children from sun exposure; the effects of the transition from child to adolescence on sun protection behaviours; and teachers' involvement in protecting children from the sun in schools. None of the research was carried out in the UK.

The review [17] included five studies that discussed the responsibility of parents for their children's safe sun behaviour. Two studies report that younger children are dependent on their parents for sunscreen and other protection. Two studies report that although parents were role models for their children's behaviour they did not always exhibit sun-safe habits and one study suggested they might themselves be ambivalent about their own desire for tanned skin. One study noted that parents aren't always with their children to ensure their safe-sun behaviour (examples of such circumstances not reported, but study had recruited parents of 1 to 10 year olds from USA university sites so presumably children were in childcare or school).

The review [17] identified five studies that noted the transition from child to adolescent is marked by increasing independence, or rebellion, and that this may have negative effects (choosing not to use sun protection (type not defined) and experimenting with intentional tanning) on safe sun behaviour. This was because parents' advice was no longer always followed (one study) as adolescents took more responsibility for their own behaviour (two studies) and they began to experiment with "intentional tanning" – that is, actively seeking a tan rather than getting one incidentally as a result of activity outside (one study). In addition, media campaigns such as "Slip Slap Slop", that had been seen as relevant when they were children, came to be regarded as "simplistic" and less credible as they got older (one study).

The review [17] identified two studies that found that school and recreation workers recognised their potential role in educating parents although parental participation, and lack of knowledge themselves were potential barriers. One study suggests that there are a number of barriers to teachers' involvement in protecting children from the sun at school. If they are to provide education about safe sun behaviour, it needs to be decided who should teach it, to whom and how often and other responsibilities may be overwhelming for teachers. In addition, liability if children were to get sunburnt or if they were allergic to sunscreen also needs to be considered.

Evidence Statement 17

There is inconclusive evidence from one good quality systematic review [17](identifying nine primary studies) about parental responsibility as a barrier to sun protection practices. Parental responsibility may be limited due to parent's failure to demonstrate sun protection practices themselves, ambivalence about their own desire for a tan, and the fact that parents are not always with their children to enforce sun protection practice (for example when children are at school) There was inconclusive evidence about the role of education and recreation workers as a barrier to sun protection for children and a lack of clarity about where responsibility lies.

[17]Garside *et al.* (2009) [++]

5.1.9 Practical Barriers

Two good quality [++] systematic reviews [15, 17] and one primary study [19] reported on the practical barriers to sun protection. The primary study [19] was also included in one of the systematic reviews [15], and is not discussed further in this section.

In a good quality [++] systematic review [15] the inconvenience of sun protection products, or the time and effort involved in remembering to carry and use them, was mentioned as a practical barrier in ten studies, with two studies conducted in the UK. The particular issues which contribute to the perception of inconvenience are: the need to carry and remember sun protection resources (three studies); the "messiness" of sunscreen (six studies); the awkwardness (not defined) of hats and sunglasses which may fall off or interfere with activities (three studies); and the inconvenience of making use of shade structures by children and young people (one study). Four study reports describe physical discomfort as a barrier to the use of protective clothing. One study finds that school staff report a number of practical barriers to encouraging children to use sunscreen before outdoor activities, including monitoring application, touching children to help with application, students sharing sunscreen, and parental permission. Six study reports said that the cost of sun protection resources was a barrier to their use. This primarily concerned sunscreen purchased by individuals, with one study mentioning the cost of hats as a barrier to implementing compulsory hat policies in low-SES schools, and one the cost of installing shade structures in schools. However, one study that focused on farmers in the USA said that cost was not a barrier. Other practical barriers to sun protection are: children being uncooperative with the application of sunscreen (two studies); the perceived ineffectiveness of sunscreen in stopping burning (one study); and the perception of adverse health consequences of sunscreen use such as acne (two studies), allergic reactions (one study), and potential long-term toxicity (two studies) [15]. Given that only two studies were from the UK it is unclear to what extent the findings are applicable in the UK setting. However, the authors state that there is no specific reason to think that the social barriers identified are not applicable to the UK.

A second good quality [++] systematic review [17] included six studies that reported on the hassle of using sun protection, two of which were conducted in the UK. Sun protection through use of sunscreen, wearing hats and covering up with long sleeves all had limitations. Sunscreen use was seen as a hassle in six study reports of qualitative research due to its expense, mess, time to apply and potential to cause irritation or allergies. In three study reports, parents said that children were uncooperative when it came to applying sunscreen. Four study reports highlight impracticalities of hat-wearing which limits children's activities, and may be rejected as unfashionable. In three study reports, covering up through wearing long sleeved tops was seen as uncomfortable in the heat. Rash vests and wetsuits may be better for young children on the beach, as t-shirts may be repeatedly removed [17].

Evidence Statement 18

There is strong, consistent evidence from two good quality systematic reivews (one reporting ten studies [15] and one reporting six studies [17] with a total of four studies conducted in the UK) that there are perceived practical barriers to sun protection practice. Sunscreen use was seen as a hassle in the majority of studies due to its expense, messiness, time to apply and potential to cause irritation or allergies; parents reported that sunscreen application was difficult in uncooperative children. Additional practical barriers to sun protection included hat wearing limiting children's activities and long clothing being uncomfortable in the heat.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

5.2 FACILITATORS FOR SUN PROTECTION KNOWLEDGE AND PRACTICES

This section reported data for the following research question: 'What factors might act as barriers to, and facilitators for, the effective implementation of activities aimed at optimising safe sun exposure knowledge and protection practices, as expressed by the recipients or the providers of interventions?'

Two good quality [++] systematic reviews [15, 17] and three poor quality [-] primary studies [13, 14] discussed cues to action: that is, factors which may help to trigger preventive actions for skin cancer. No studies were identified that reported on cues to action for preventing vitamin D deficiency due to UV underexposure.

Sources of positive influence

One good quality [++] review [15] identified ten studies that discussed this theme, nine of which were from New Zealand, USA, Australia and Canada, and one of which was from the UK. Seven studies, found that in most school settings, children aged 6-8 years (1 study), young people aged 12-17 years (4 studies), and young adults aged 18-25 years (1 study) identified parents, especially mothers, as important sources of positive encouragement and practical support for adopting sun protective behaviours (most example refer to use of sunscreen). One further study of older women aged 75 to 90 years found that as children, they had also been positively influenced by parents. Other adults, such as teachers and lifeguards, were identified as sources of positive encouragement for children aged 6-8 years and young people aged 8-17 years (2 studies) to adopt sun protective behaviours. Seven study reports found differences between children (approximately 8-13 years) and older young people (approximately 14-17 years) in sources of positive encouragement to use various forms of sun protection. One study found that parents or carers apply sunscreen more often to younger children, while older children are more likely to apply it themselves.

Five studies find that younger children are more likely to listen to parents', or other adults such as teachers' advice to use sun protection such as sunscreen or clothing, because of their role as authority figures, while adolescents are more likely to be influenced by their peers (1 study from the UK). Young people in these studies described the shift towards peer influence as part of a process of asserting their independence from authority. However, the remaining one study found that adolescents aged 16-17 years felt themselves to be more receptive to health messages than children and younger teenagers. One US study which interviewed recreation staff found that they felt that they had not been an effective source of encouragement to encourage positive sun protective behaviour such as wearing clothes or applying sunscreen. Another study of farmers in the USA notes that doctors rarely acted as a source of encouragement for positive sun protection behaviour [15].

In a second good quality [++] review [17] three studies from Australia and the USA referred to the positive influence of parents and other adults for younger children (3 studies) and peers for older children (1 study).

Evidence Statement 19

There is strong, consistent evidence from two good quality systematic reviews (one identifying 10 primary studies [15], the other three primary studies [17]) that parents are an important source of positive encouragement and practical support for adopting sun protective behaviours for children and young people (ten studies). Evidence about sources of positive influences for adults was inconclusive.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

Knowing someone with skin cancer

One good quality [++] review [15] identified five primary studies for this theme. None were from the UK. They were conducted in USA, New Zealand and Australia. All studies indicated that adults and young people reported that knowing someone with skin cancer may act as a cue to adopt sun protection behaviours in general.

In a second good quality [++] review [17] four studies suggest that knowing someone who had skin cancer was motivating to take more care in the sun (not defined).

Evidence Statement 20

There is strong, consistent evidence from two good quality systematic reviews (one including five primary studies [15] the other including four primary studies [17]) that knowing someone with skin cancer may motivate people to adopt sun protection behaviours.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

5.2.1.1 Institutional policies

One good quality [++] systematic review [15] identified six studies that discussed this theme, all of which were from USA, New Zealand and Australia. Two studies from New Zealand and the US found that primary school staff were willing to implement school-wide sun protection policies such as: physical shade structures or trees; 'no hat, no play' or 'no hat, play in the shade' rules; provision of free sunscreen; or rescheduling outdoor activities. Obtaining funding for such policies, especially environmental change, was a barrier in some cases. One further Australian study noted that policies such as 'no hat, no play' are common in Australian primary schools, but are rare in secondary schools. One study reported that the scheduling of outdoor school activities such as lunch breaks and sports events, typically at hotter times of day, is outside the control of students. One study, a process evaluation of a sun protection intervention ("Pool Cool‟) at outdoor pools, finds that signs, sunscreen pumps and shade structures were viewed positively and frequently used by pool-goers. Participants in one study suggested the use of venues such as community centres to diffuse sun protection messages beyond schools to facilitate better sun protection practices. Potential barriers to positive outcomes at community venues included low attendance and perceived low priority of skin cancer as a health subject.

Evidence statement 21

There is strong, consistent evidence from one good quality systematic review [15] (including six primary studies) that primary school teachers are willing to implement sun protection policies (three studies). Evidence was less clear for policies in secondary schools (two studies), outdoor pools (one study) and other community venues (one study).

[15]Lorenc *et al.* (2010) [++]

5.2.1.2 Specific triggers for sun protection behaviours

One good quality [++] systematic review [15] included seven studies relevant to this theme, three of which were from the UK. Three studies from the USA and Australia and all showed that adults of all ages were more likely to use sun protection in general in summer and in sunny weather. Two study reports from the UK, one of male outdoor workers (aged 20-50 years) and the other of young women (aged 12-15 years), reported the belief that sun protection measures are not required in the UK due to the lack of hot, sunny weather. Two study reports (one Swedish and one from the UK) described adults (aged 16-54 years) putting on a T-shirt or applying sunscreen only after beginning to burn.

Evidence statement 22

There is consistent evidence from one good quality [++] systematic review [15] of seven studies (three of which were from the UK) that adults of all ages were more likely to use sun protection in general in summer and in sunny weather. Two study reports from the UK, one of male outdoor workers (aged 20-50 years) and the other of young women (aged 12-15 years), reported the belief that sun protection measures are not required in the UK due to the lack of hot, sunny weather. Two study reports (one Swedish and one from the UK) described adults (aged 16-54 years) putting on a T-shirt or applying sunscreen only after beginning to burn.

[15]Lorenc *et al.* (2010) [++]

5.2.1.3 Media messages and campaigns

One good quality [++] systematic review [15] identified three studies from the USA and Australia in which young adults (18 to 25 years) and adults discuss the influence of the media on individuals' behaviour. All of these studies show the belief that representations in the media may have an adverse effect on sun protection behaviours. For example, one respondent in a study of young people (aged 18 to 25 years) pointed out that characters on television, for example in *Baywatch,* are never seen using sunscreen.

A second good quality [++] systematic review [17] identified nine study reports that discuss aspects of media campaigns about skin cancer prevention. Three were from the UK. In one UK study there was good recall of a TV advert and its key messages to cover up and use sunscreen. One study found that adolescents viewed the general mass media portrayal of tans as appealing, as did adults who had low concern about sun safety in another study. In the latter study people categorised as having high concern about sun safety were aware of a lot more negative publicity about the potential negative affects of sun exposure. Although sun safety messages from the media were seen as credible, adolescents relied on peers and young children relied on parents and teachers as most important source of knowledge. It is suggested that adverts may lose their power as they become familiar. Children may be more receptive to sun safety messages portrayed in a fun way, for example humorous or cartoon advertisements (4 studies). However, adolescents considered some adverts to be unrealistic and "corny" and one study suggested that more graphic "shock" images would be preferred especially by older boys. In the UK participants in one study did not think it was appropriate to frighten people even though they did feel that people lacked sufficient knowledge about skin cancer.

One poor quality [-] qualitative study [19] used focus groups to explore influences on the sun exposure behaviours of 28 girls in the UK, aged 12–15 years including health promotion messages in the media. The participants were able to recall adverts and remember the health messages in them. However, they felt that the messages did not target their age group as they mainly focused on younger children and adults. Additionally, participants stated that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan.

"People are so tanned in [sun safety] adverts; it just makes you want to tan more." (Beth, Year 8. Source: Curtis, 2009)[19]

Each focus group expressed views that their behaviour had not been positively influenced by their schools, stating that schools had provided little education regarding sun safety. This included the impact of the school nurse. It was considered that only the 'good' (Rebecca, Year 8) people complied with school recommendations for sun protection, with girls eager to provide examples of times that they refused to listen and adhere to sun protection suggestions. It was unclear how much this was due to rebellion, or a desire to conform to prevailing cultural norms, and impress peers. Respondents in each focus group asserted that they felt bombarded with health messages relating to other issues, including smoking and healthy eating. Compared to these, sun exposure was not considered as an important health concern:

> 'I don't think it's that important … it's quite important, but there's other stuff, like smoking, that's more important.' (Sarah, Year 8, Source: Curtis, 2009)[19]

Evidence statement 23

One good quality [++] systematic review [15] identified three studies from the USA and Australia in which young adults (18 to 25 years) and adults discuss the influence of the media on individuals' behaviour. All of these studies show the belief that representations in the media may have an adverse effect on sun protection behaviours. For example, a study participant pointed out that characters in the TV programme *Baywatch* are never seen applying sunscreen.

A second good quality [++] systematic review [17] included nine studies that discuss aspects of media campaigns about skin cancer prevention. Three were from the UK. There was good recall of a UK TV advert and its key messages to cover up and use sunscreen (1 study). Adolescents viewed the general mass media portrayal of tans as appealing. In another study who were categorised as having high concern about sun safety were aware of a lot more negative publicity about the potential negative affects of sun exposure compared to those categorised as having low concern. Three studies indicated that media campaigns need to engage younger children, and two suggested that this should be achieved whilst not alienating older children. One of the studies suggested that programmes need to change regularly to maintain their impact and that another suggested that shock images may appeal to older boys.

One poor quality [-] qualitative study [19] used focus groups to explore influences on the sun exposure behaviours of 28 girls in the UK, aged 12–15 years including health promotion messages in the media. The participants were able to recall adverts and remember the health messages in them. However, they felt that the messages did not target their age group as they mainly focused on younger children and adults. Additionally, participants stated that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan. Participants were eager to provide examples of times that they refused to listen and adhere to sun protection suggestions at school. It was unclear how much this was due to rebellion, or a desire to conform to prevailing cultural norms, and impress peers. Respondents asserted that they felt bombarded with health messages relating to other issues, including smoking and healthy eating and compared to these, sun exposure was not considered as an important health concern. The authors recommend that health promotion messages specifically target teenage girls but did not state how this might be achieved.

[15]Lorenc *et al.* (2010) [++]
[17]Garside *et al.* (2009) [++]

5.3 COMMUNICATION STRATEGIES AND INTERVENTIONS

This section reported data for the following YHEC research question: 'What are the views and experiences of people (from all perspectives including those of health practitioners) receiving communication strategies and interventions about improving safe sun exposure knowledge and sun protection practices, which act as barriers or facilitators?' and identified two qualitative studies [13, 19] and one study that was mainly quantitative but with a qualitative (free text comments) section for participant views about the intervention [14].

5.3.1 Appearance-Based Interventions

Four poor quality [-] studies [13, 14, 18, 20] from the UK, evaluated appearance-focussed interventions in young people, two using focus groups and interviews (Williams 2013) [18] and the third by collecting free text comments from an evaluation questionnaire [14].

One poor quality [-] qualitative study studies [13] from the UK used an appearance-focussed facial-ageing sun protection intervention with 43 male university students aged 18 to 34 years which involved showing them computer generated pictures of how their faces would age with and without UV exposure [13]. The majority of men (32/43, 74%) taking part felt that viewing the photographs may have an effect on their future sun protection and/or sun exposure behaviours, which was linked to the shock of seeing the effect of UV exposure on their skin: that is, the shock of seeing the difference in damage between the photographs appeared to make participants feel that they wanted to change their behaviours in the future. Participants in general talked more about their future sun protection intentions than UV exposure behaviours, saying that they did not want to look like the UV-aged image so were now motivated to use sun protection, for example:

> "Yeah. I don't wanna look like that guy there [UV aged photograph]. I'm gonna slap on the sun tan lotion!" (Nathaniel, 20, Source: Williams, 2013)[13]

In a poor quality [-] qualitative study [18] conducted by the same research team, an appearance-focussed facial-ageing sun protection intervention was conducted with 47 female university students aged 18 to 34 years in the UK. The women were shown computer generated pictures of how their faces would age with and without UV exposure[13]. All of the women said that the photos would have an impact on their future sun protection and UV exposure behaviour [18]:

> "I'd probably try and remember to use more sun cream because the one without [UV exposure] looks better than the one with [UV exposure] and like all the pruple and that looks like a Doctor Who monster" (Valentina aged 20, Williams, 2012)[18].

In a poor quality [-] qualitative study [20] conducted by the same research team, an appearance-focussed facial-ageing sun protection intervention was conducted with 60 adolescents (50% female, mean age 12.58) in Wales. The adolescents were shown computer generated pictures of how their faces would age with and without UV exposure[13]. The majority said that the photos would have an impact on their future sun protection and UV exposure behaviour [20]:

> "It's made me want to use more sun tan lotion…yeah like plaster it on you before you go to school!" (Bruce, age 11, Williams, 2013b)[20]

One poor quality [-] mixed methods UK study [14] used a facial imaging intervention with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon with the aim of preventing skin cancer. The intervention involved training 66 beauty therapy students and tutors to deliver peer-to-peer mini beauty consultations, using a UV facial scanner to highlight skin type and early signs of sun damage, providing personalised advice and offering fake tan tips as an alternative way to achieve a tan. As part of the evaluation, 51 trainers (77%) completed a questionnaire after the training. Participants were asked: "If, as a result of this session, you are planning to change your own sun habits, please comment here". Of the 51 respondents 31 (61%) wrote comments. Some of the responses referred to covering up: "Try and find a hat that I like and feel happy wearing"; "Yes. Be more aware of the time of day and wear a hat etc." Some comments referred to avoiding the sun: "Wear more sun cream. Don't go out in peak times."; and most comments referred to the use of sunscreen: for example, "Use higher factor sunscreen"; "Will make sure of applying suncream on my face on a daily basis", and "Definitely slow down binge sunbathing and apply suncream all the time".

Evidence statement 24

There is weak evidence from three poor quality [-] qualitative studies [13, 18, 20] from the UK (groups of 43 male university students, 47 female university students, 60 school children median age 12.58) that using a photoaging intervention can generate awareness of the damage caused by sun exposure and intentions to adopt sun protectvie behaviour. However there were some slight gender and age differences. The majority of men (32/43, 74%), the majority of adolescents and all of the women taking part in interviews and focus groups said that viewing the photographs may have an effect on their future sun protection and/or sun exposure behaviours due to the shock of seeing the effect of UV exposure on their skin.

There is weak evidence from one poor quality [-] mixed methods UK study [14] used a facial imaging intervention with approximately 600 teenagers aged 15 to 19 (60% female) in three colleges in Devon. The intervention involved training 66 beauty therapy students and tutors to use a UV facial scanner to highlight skin type and early signs of sun damage in study participants. 31/51 trainers (77%) said they planned to change their own sun habits as a result and 61% wrote comments such as: "Try and find a hat that I like and feel happy wearing"; "Yes. Be more aware of the time of day and wear a hat etc.": "Wear more sun cream. Don't go out in peak times." Most comments referred to using sunscreen more often.

[13]Williams *et al.* (2013a) [-]
[20]Williams *et al.* (2013b) [-]
[18]Williams *et al.* (2012) [-]
[14]Bird *et al.* (2011) [-]

Evidence statement 25

There is weak evidence from four studies that directly elicited views from people who had been the recipients of photoaging or UV scanner interventions that these interventions had an emotional impact relating to the extent of damage caused by sun exposure [13, 18, 20], [13]. Three poor quality [-] qualitative studies [13, 18, 20] from the UK (groups of 43 male university students, 47 female unviersity students, 60 school children median age 12.58) generally elicited emotional views of disgust from participants when viewing images of how they would look with sun damaged skin [13]. However, there were a minority of men who valued looking masculine and a minority of women who were relieved that their skin was not as damaged as they had feared given past sun exposure. Trainee beauty therapists who received an appearance-based intervention expressed concern about the images of skin damage and skin ageing they had seen during their training sessions for example, '*The results from my scanner image made me more aware*.'[14]

[13]Williams *et al.* (2013a) [-]
[20]Williams *et al.* (2013b) [-]
[18]Williams *et al.* (2012) [-]
[14]Bird *et al.* (2011) [-]

Evidence statement 26

Weak evidence from one poor quality qualitative study [19] of UK focus groups about health promotion messages conducted with 12 to 15 year old girls showed that although the participants could remember the health promotion adverts and health messages in them, they felt that the messages did not target their age group and in addition, even in health promotion messages, models continued to be depicted as brown and attractive [19].

[19]Curtis *et al.* (2009) [-]

5.4 CONFLICTING MESSAGES

This section reported data for the following research question: 'How do people interpret and respond to conflicting messages in relation to sun exposure and health?' and identified two systematic reviews [9, 15].

One good quality systematic review [15] investigated protection resources and changes to the environment to prevent skin cancer. Seven primary studies that discussed the perceived health benefits of sun exposure were included, one of which was conducted in the UK.

- Three studies reported the belief that ultraviolet exposure is beneficial because it provides Vitamin D;
- Two studies reported that sun exposure is believed to protect against future skin damage or cancer by increasing "resistance";
- Three study reports discuss the perception that outdoor activities which involve sun exposure are healthier than indoor activities, both among adults and children. One study found that this perception was linked to the freedom to play actively for children.

A poor quality systematic review [-] of quantitative studies investigated confounding factors, or communications reinforcing or countering interventions for skin cancer prevention [9]. A recent confounding factor which had received prominence in the media related to the Vitamin D debate. They reported on evidence from Australia of the potential impact of this coverage on sun exposure behaviours. They suggest that the link between Vitamin D levels and a wide range of medical conditions tends to be somewhat more cautiously reported in the academic literature than in the consumer media and academic studies that have failed to find a direct relationship between Vitamin D levels and cancer prevention tend not to be reported at all by consumer media. They warn that the impact of the consumer media coverage cannot be ignored. In Australia, a large-scale survey of Queensland residents found significant increases since 2004 in the percentage of the population believing that the use of sun protection creams increases the risk of Vitamin D deficiency and that Vitamin D helps prevent cancer. Many respondents also significantly overestimated the amount of sunlight needed to maintain healthy Vitamin D levels. While the impact of consumer media editorials has not yet been directly investigated, the authors of the Queensland study suggest that misconceptions regarding Vitamin D and sun exposure may influence people to reduce existing sun protection behaviours [9].

Evidence statement 27

There is consistent evidence from one good quality systematic review [++] [15] of seven primary studies that there are both accurate and erroneous perceived health benefits of sun exposure. Three studies reported the belief that ultraviolet exposure is beneficial because it provides vitamin D; two studies reported that sun exposure is believed to protect against future skin damage or cancer; and three studies discuss the perception that outdoor activities that involve sun exposure are healthier than indoor activities [15].

There is weak evidence from one poor quality systematic review [-] [9] that in an Australian study people significantly overestimated the amount of sunlight needed to maintain healthy Vitamin D levels. The review reported that misconceptions regarding Vitamin D and sun exposure might influence people to reduce existing sun protection behaviours [9].

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

Section 6: The Role of Professional Intermediaries

This section reports results for research theme three: Reports or reviews of questionnaires, surveys or focus groups which have investigated the role (knowledge, confidence, practice, intentions) that professional intermediaries, including healthcare professionals and others, play in conveying complex sun exposure risk information, and their experiences in that role.

Data responding to the following research questions are reported:

2.3.10 Do health care professionals and others with a duty of care have pre-existing and/or post intervention views, knowledge, beliefs, attitudes and perceptions of the health benefits and risks of sun exposure which act as barriers or facilitators?

2.3.11 How do health care professionals and others with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?

6.1 VIEWS, KNOWLEDGE, BELIEFS, ATTITUDES AND PERCEPTIONS OF HEALTH CARE PROFESSIONALS

One good quality [++] systematic review was identified that assessed the views of service providers with regard to their role in providing health risk information in relation to preventing skin cancer [15]. A poor quality [-] evaluation [21] of a skin cancer prevention and awareness campaign to people ageed over 50 through community pharmacies in Devon provided information that pharmacy staff provided with the SunSmart programme materials were committed to providing skin cancer information. No studies were identified in relation to their role in providing health risk information about prevention of vitamin D deficiency through UV underexposure.

One good quality [++] review [15] included three studies that discussed the views of service providers in the USA and New Zealand. Included studies found that service providers, or potential service providers such as teachers, other school staff and staff at leisure facilities, were generally optimistic about the prospects for intervention and policy change, and willing to take an active role in implementing policy. Staff in schools who had implemented integrated sun-protection policies were actively engaged in modelling and encouraging good sun protection practices. However, in some cases, potential service providers were concerned about the potential extension to their responsibilities, and about the boundaries and expectations around this extended role. There was also the risk, particularly in schools, of an overload of policies and recommendations leading to unclarity about what activities to prioritise. The authors concluded that there may be differences between countries in the organisational context of service delivery, which may create barriers to the applicability of these findings to the UK context.

A poor quality [+] evaluation [21] of the implementation of a SunSmart campaign in pharmacies in Devon showed that pharmacists in both the standard SunSmart campaign (posters, leaflets and postcards) and the enhanced campaign (with training and quizzes) were committed to engaging with customers aged over 50 to discuss skin cancer awareness and skin cancer prevention:

> "This was a great campaign – I was delighted to be involved. Staff have taken a real interest in skin awareness. I present a health topics show on local community radio station Riviera FM, so took the opportunity during the campaign to talk about skin cancer prevention and early diagnosis on the show, using what I learnt at the training. I had really positive feedback – listeners especially liked the 'ABCD' guidance to help them remember what to look out for." (Pharmacist manager, Bird, 2011)[21]

Evidence statement 28

There is strong evidence from one good quality [++] review [15] that included three studies from the USA and New Zealand that suggests service providers, or potential service providers such as teachers, other school staff and staff at leisure facilities, were generally optimistic about the prospects for intervention and policy change, and willing to take an active role in implementing policy. Staff in schools who had implemented integrated sun-protection policies were actively engaged in modelling and encouraging good sun protection practices. However, in some cases, potential service providers were concerned about the potential extension to their responsibilities. There was also the risk, of an overload of policies and recommendations leading to a lack of clarity about what activities to prioritise. There may be differences between countries in the organisational context of service delivery, which may create barriers to the applicability of these findings to the UK context.

There is weak evidence from a poor quality [+] evaluation [21] of the implementation of a SunSmart campaign in pharmacies in Devon that pharmacists in both the standard SunSmart campaign (posters, leaflets and postcards) and the enhanced campaign (with training and quizzes) acknowledge that they have a role in promoting skin cancer awareness and skin cancer prevention and act on it. However, involvement in the campaign was voluntary and only 50% of invited pharmacies volunteered.

[15]Lorenc *et al.* (2010) [++]
[21]Bird *et al.* (2011) [+]

6.2 ROLE PERCEPTION OF HEALTH CARE PROFESSIONALS

This section reported data for the following research question: 'How do health care professionals and others with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?' and identified two systematic reviews [15, 17].

A good quality systematic review [++] conducted a review of qualitative evidence for sun protection resources and changes to the environment to prevent skin cancer [15]. It included three studies that discussed the views of service providers. None of the studies were conducted in the UK. The authors concluded that there may be differences between countries in the organisational context of service delivery, which may create barriers to the applicability of these findings to the UK context. Included studies found that service providers, or potential service providers such as teachers, other school staff and staff at leisure facilities, were generally optimistic about the prospects for intervention and policy change, and willing to take an active role in implementing policy. Staff in schools who had implemented integrated sun-protection policies were actively engaged in modelling and encouraging good sun protection practices. However, in some cases, potential service providers were concerned about the potential extension to their responsibilities, and about the boundaries and expectations around this extended role. There was also the risk, particularly in schools, of an overload of policies and recommendations leading to unclarity about what activities to prioritise [15].

A second good quality systematic review [++] conducted a review of qualitative evidence for barriers to and facilitators to conveying information to prevent first occurrence of skin cancer. [17] Two primary studies that discussed how adults with a duty of care perceived their role in providing health risk information, neither was conducted in the UK. The review found that school and recreation workers recognised their potential role in educating parents although parental participation, and lack of knowledge themselves were potential barriers. One primary study suggested that there were a number of barriers to teachers' involvement in protecting children from the sun at school. If they were to provide education about safe sun behaviour, it needs to be decided who should teach it, to whom and how often [17].

Evidence statement 29

Two good quality systematic reviews reported on how health care professionals and others with a duty of care perceived their role in providing health risk information and in aiding the public understanding of health risk. [9, 15]

One review included three primary studies showing that service providers, including school staff and leisure staff have positive attitudes towards resource provision and environmental change interventions. However, a further two primary studies reported concerns about the potential extension to their responsibilities and one study raised the prospect of an overload of policies and recommendations [15].

The second review included two primary studies. School and recreation workers recognised their potential role in educating parents, but identified that there might be barriers to teachers' involvement in providing education about safe sun behaviour in relation to who should teach it, to whom and how often .[9].

[9]Eagle *et al.* (2009) [+]
[15]Lorenc *et al.* (2010) [++]

Section 7: Discussion and Conclusion

The purpose of the review (the NICE scope) was to provide evidence of factors or circumstances that form barriers and/or facilitators to the implementation of risk communication strategies that seek to present and disseminate complex health risk information relating to ultraviolet radiation exposure. To do this the review investigated three main research themes, within which were a number of research questions. Please see section 2.7.3 for a list of these themes and questions.

7.1 OVERVIEW OF STUDIES

20 studies were included in this review: three systematic reviews (two qualitative [15, 17] and one synthesis of quantitive studies[9]), six qualitative studies [13, 18-20, 28, 29], eight quantitative studies [5-8, 10, 11, 16, 30], and three studies that used mixed methods [12, 14, 21]. The three systematic reviews were previously commissioned by NICE and informed the early guidance (PH32) on skin cancer.

The review was intended to include studies of both over- and under-exposure to UV, however no studies on under-exposure were identified.

7.2 IMPLICATIONS OF FINDINGS FOR THE NICE SCOPE QUESTIONS

7.2.1 From what sources do people gain their knowledge regarding safe sun exposure (for example, news media, health professionals, peers)?

The evidence suggests that the majority of people gain their information on skin cancer prevention from traditional media such as television, radio and newspapers, but in particular television. There was very little evidence (one systematic review and three poor quality studies) investigating the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices. Mass media interventions appear to be successful in raising awareness levels but do not appear to confer long term behaviour change.

The overriding impression from the research is that people rarely proactively seek information. Younger people were the group most likely to seek sun exposure information from friends and family, and as a group were more likely to use the internet to gain information than older people. This suggests that the further investigation of the use of different information sources to reach different groups might be worthwhile.

Men and women in the UK, from the few studies presented here, seem to differ in their preferred sources of information and also in their reactions to interventions presenting the impact of UV exposure in terms of skin damage.

For younger children there is some evidence that parental authoritativeness in the home is an important predictor of adolescent use of sun protection, as is friends' parents' authoritativeness in terms of adolescents' use of sun protection but not for adolescents' sunbathing behaviour.

Health care professionals including pharmacists do not seem to be a high priority for information or knowledge when people do seek information about sun protection, despite the information from a single study showing that pharmacists might be willing to have a higher profile in active skin cancer prevention.

7.2.2 How do people make judgments about risks from sun exposure and how does this influence decisions about sun exposure and protection practices?

Although there is some evidence that people understand the need for sun protection behaviours and that sunscreen and other measures are protective, there was evidence that people did not act on this knowledge and, when they do, may only implement one sun protection activity. There was a lack of research asking people why they did not act on what they knew or suspected to be best practice, although where they did respond, a range of reasons were provided including hassle and desire for the positive experiences of having a tan such as perceived healthiness and well-being and attractiveness.

7.2.3 What is the relationship between the source of knowledge, levels of accurate knowledge and sun exposure and protection practices?

This review did not identify research which provided explicit information on this chain of relationship. Outcomes detailing people's information sources are provided in 7.2.1 but there is little evidence on the relationship between the knowledge source and levels of accurate knowledge or sun exposure and protection practices. What is evident are high levels of misunderstanding and misinterpretation of the advice on sun protection that is provided from campaigns, training and information provided by others. This is accompanied by similar high levels of failure to implement sun protection practices.

Sun protection information sources may even be undermining themselves. For example, when considering the messages to be conveyed, participants in one study noted that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan. This type of barrier created by messaging may also be compounded by the fact that individuals feel "bombarded" with health messages relating to a range of issues including smoking, alcohol and obesity, in comparison with which, sun exposure was not considered to be as important.

One study of university students suggest optimistic assessments of skin cancer likelihood are being made and this may be symptomatic that generally sun exposure may not be being linked to the probability of getting skin cancer.

There is evidence that the experience of melanoma or pre-cancerous moles by participants or people they know, or a family history of malignant melanoma can increase perceived risk, but this may still not translate into sun protection practices. For those without such prior knowledge or experience, the risk of skin cancer is not appreciated or is seen as not of immediate concern, particularly among children. People avoid thinking about skin cancer or adopt an optimistic framing that minimises their own perceived susceptibility, such as assuming that others exposure to risk factors must be higher than their own. People have highly inaccurate and uninformed beliefs that sun exposure provokes "resistance" to skin damage, burning or cancer in the future. In the light of clear misunderstandings and popular belief, it appears that messages about the risk of sun exposure are not reaching the public accurately. Concurrently, people do not appear to be mentioning the benefits of sun exposure as a justification for sun exposure habits, suggesting that the beneficial effects are even less well appreciated.

Studies in adults found that skin cancer was thought to be easily cured, was considered a possible future concern, and was something people preferred not to think about or where potential concerns were outweighed by the perceived short term benefits of a tan. It seems that the signs of visible aging (wrinkles, spots, freckles) revealed by photoaging interventions may be taken more seriously than the risk of skin cancer, showing that personal attractiveness and looking youthful could be key facilitators for sun protection. There was no reseach showing the negative impacts of inadquate sun exposure such as rickets. Sun exposure messages, advice and the use of the UV index are struggling against the widespread perceptions that a tanned appearance is attractive or aesthetically pleasing, and that white skin is unattractive, unhealthy and indicative of being unfit. Along with attractiveness, a tan was thought to raise self-esteem.

In the study of beauty school trainees an educational programme had an impact on a range of sun protection intentions, but most of the comments (73%) mentioned increased use of sunscreen compared to 9% who mentioned covering up, despite teachers emphasizing that sunscreen was the least important form of protection. The fact that the majority of participants seem to have missed a key message seems indicative of the fate of much sun exposure advice and interventions. The key messages are often being misunderstood or de-emphasised in favour of other message.

7.2.4 To what extent do people understand the UV Index? How does it affect their sun exposure and protection practices?

There is low awareness of the UV index and even lower action based on the information it conveys. There was information that people had little understanding of what the UVI conveys and it is not clear why people are not engaging with the index, why they do not act on it, and whether they really understand it. Among other inaccurate information there seems to be evidence that incidental tanning (i.e. tanning from carrying out activities outdoors) was less dangerous and less likely to require sun protection compared with deliberate tanning which was viewed as unhealthy.

One key barrier to the uptake of sun exposure messages may be the misperceptions around the UK climate, that sun protection is not so applicable due to the lack of hot, sunny weather in the UK. Cloudy weather and cool days create a false sense of security with one UK report indicating that preventive measures are taken up after beginning to burn.

7.2.5 What has been the impact of increased knowledge of the benefits of vitamin D on sun exposure practices?

There was little evidence that there is increased knowledge of the benefits of vitamin D or that this knowledge has affected sun exposure practices. The focus of studies identified for this review was largely on the health risks associated with UV over exposure; few studies reported health risks associated with UV under exposure, or the balance of risk. There was some evidence that the benefits of vitamin D might be over interpreted because people over-estimate how much exposure is required to achieve the required level for vitamin D production. Emphasising the benefits of sun exposure may inadvertently reinforce some of the popular misconceptions about sun exposure such as the idea that it increases the skin's protective qualities against future sun damage by increasing 'resistance'.

7.2.6 What are the barriers to, and facilitators for, risk communication strategies and interventions in optimising safe sun exposure knowledge and protection practices? How does this vary by subpopulations?

A range of barriers have been identified to risk communication strategies and interventions.

- Appearance-based interventions such as photoaging have shown that men may react in surprising ways to personalised images of sun damaged/aged skin, being able to draw positive aspects about the images;
- Appearance-based photoaging has shown that some women are reassured by photoaging as they expected their skin to look much worse, which is not the intended effect;
- Adults indicate that sun protection is not strongly supported by social norms and that sunscreen use has a strong association with particular contexts such as being on holiday, which means that encouraging its use as routine is an additional challenge;
- Concern over expense (sunscreen);
- Inconvenience or hassle, especially where children are concerned, of adopting sun protection clothing, sunscreen and hats;
- Perceptions that covering up or wearing clothes on the beach is not fashionable, and the clothes are unattractive;
- Tans are perceived as healthy, convey fitness and wellness and raise self-esteem;
- Pale skin is seen as pasty and unhealthy;
- Young people are more likely to report barriers to sun protection use than older people;
- Teenagers see media messages and parental behaviours regarding sun protection as focused on young children and not relevant to them;
- Messages aimed at teenagers are likely to face resistance from teenagers who do not like being told how to behave.

Facilitators for risk communication included:

- Parents are an important source of positive encouragement and practical support for adopting sun protective behaviours for children;
- Knowing someone with skin cancer can encourage individuals to practice better sun protection practices;
- Photoaging interventions can elicit emotional responses which may translate in intentions to reduce excessive sun exposure to avoid the skin aging effects (wrinkles, spots and sagging) of UV exposure;
- Each age group seems to be requesting age-group appropriate messaging and context;
- Sun exposure messaging may need to change regularly, especially in the case of those aimed at young people, to maintain their impact.

7.2.7 What are people's knowledge, beliefs, attitudes and perception of the benefits and risks of sun exposure?

Women are more likely to wear sunscreen than men, more likely to never go out in the sun, more likely to avoid the midday sun, more likely to stay in the shade and less likely to wear a hat than men. Males may attribute convenience over cosmetic (females) as the primary barrier to use of sun protection methods.

7.2.8 How do people interpret and respond to conflicting messages on sun exposure and health? To what extent are they aware that messages differ according to individual risk factors?

There was little evidence that many people perceived conflicts within messages on the risk or benefits of sun exposure and health. The focus of studies identified for this review was very largely on the health risks associated with UV over exposure; few reported health risks associated with UV under exposure, or the balance of risk. This means that the UV exposure message is all 'bad news' and the complex risk message presented for UV exposure is not being addressed in research. However, given the high level of poor understanding of the risks of over-exposure, how to communicate a more complex picture of risk and benefit is a considerable question. Messages that provide a picture of risk and benefit are likely to run the risk of being interpreted in favour of sun exposure since it offers the benefits of vitamin D exposure and because people over-estimate how much exposure is required to achieve the required level for vitamin D production. Emphasising the benefits of sun exposure may inadvertently reinforce some of the popular misconceptions about sun exposure such as the idea that it increases the skin's protective qualities against future sun damage by increasing 'resistance'.

Although there are some UK studies of differing skin types and conducted with relatives of people with melanoma, there was sparse evidence identified for this review on the extent to which people in general are aware that risks are different given individual circumstances. There was no evidence indicating awareness that certain groups, such as the elderly, should seek to ensure they receive adequate UV exposure.

7.2.9 Do health care professionals and others with a duty of care have pre-existing and/or post intervention views, knowledge, beliefs, attitudes and perceptions of the health benefits and risks of sun exposure which act as barriers or facilitators?

Little information was identified to answer this question.

7.2.10 How do health care professionals and others with a duty of care perceive their role in providing health risk information and in aiding the public understanding of health risk?

There is little evidence that parents can be relied upon to protect their children form the sun. Some parents are ambivalent about sun protection practices and in failing to practice sun protection, demonstrating ambivalence about their own desire for a tan may not be encouraging children to minimise sun exposure. Ensuring children are protected from the sun is another chore especially when children struggle against the perceived inconvenience of covering up, messy sunscreen or hats, and even when parents are willing, they may not always be with their children to enforce sun protection practice.

For others with a duty of care to children and the less able, the lack of clarity about the roles and responsibilities may be a barrier to achieving adequate sun protection for more vulnerable groups. There is some evidence that primary school teachers as a group are willing to implement sun protection policies but evidence was less clear for policies in secondary schools, and it is unclear how much of this evidence is applicable to the UK context.

Sparse evidence was identified on how UK organisations, such as schools, workplaces, swimming pools and other community venues, can help with removing barriers to safe sun exposure practices or facilitate safe sun exposure. Potential institutional barriers to sun protection in schools were explored and a range of barriers to impementing organisational change were clearly illustrated. But there was no evidence of the success or failure of efforts to achieve change at the organisational level and what factors might contribute to success. There is evidence that service providers, including school staff and leisure staff have positive attitudes towards sun protection promotion and environmental change interventions, but also evidence of concerns about the potential extension to their responsibilities and how to manage new policies. School and recreation workers recognised their potential role in educating parents, but identified that there might be barriers to teachers' involvement in providing education about safe sun behaviour in relation to who should teach it, to whom and how often.

7.3 LIMITATIONS OF THE EVIDENCE

Many subgroups of the general population were of interest to this review, but there were relatively few studies identified which investigated the barriers and facilitators around sun exposure messages (risks and benefits) in specific subgroups and relatively few studies that explored subgroups within a larger population. There was some research investigating barriers and facilitators for outdoor workers, children and individuals at higher risk of melanoma, but other groups, such as people who are non-English speaking or whose first language is not English, people from different religious or cultural backgrounds, people with dark skin, or people who have low or no exposure to the sun, were not investigated at all in the studies identified in the search period for this review. This means that for all of the scope questions discussed above there is no information, from this review, to provide insights into the specific barriers and facilitators of importance to those subgroups. Many of the studies report little information on the demographics of their participants, which hampers the identification of relevant subgroups and their views on the risks and benefits of sun exposure and barriers and facilitators to sun protection.

The quality of the studies reviewed was very variable. A high percentage of the systematic reviews and RCTs reviewed were of poor quality. Systematic reviews suffered from poor reporting of their methods which leads to concerns about the rigour with which they were conducted. RCTs suffered from issues that affected their validity including concerns about randomization, allocation concealment, blinding and the use of intention-to-treat analysis, as well as the comparability of the treatment groups in terms of baseline characteristics and the number dropouts from studies.

The paucity of UK studies published since 2008 impacts on the applicability and relevance of the findings from this review.

7.4 LIMITATIONS OF THE REVIEW AND POTENTIAL IMPACT ON FINDINGS

This review searched for studies published since 1994, but resources only permitted the analysis of studies published in 2008 or later. Systematic reviews were included which reviewed studies published earlier than 2008 but systematic reviews were not available for all of the questions. This means that all of the available evidence was not included in the review, with unknown consequences in terms of the impact on the direction and strength of the evidence statements. There may also be studies in subgroups published earlier than the date cut off for this review, which might have informed evidence statements for subgroups.

Eligible primary studies were those conducted in the UK or where interventions were carried out in OECD countries but also reported barriers and facilitators. Systematic reviews included a range of countries raising questions about the applicability of findings about barriers and facilitators to the UK population.

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APPENDIX A

Search Strategies

The search strategy comprises two concepts. Concept 1 (lines 1 to 10) relates to sun exposure. This includes terms for sun-related behaviours such as sun-screen use, tanning and sun-bathing. Key consequences of too little or too much exposure to sunlight, specifically skin cancers and vitamin D deficiency, were also included within this concept. However these searches are more focused, using Medical Subject Headings (MeSH) and subheadings and title field only searches.

The second concept (lines 10 to 54) is very broad and covers the aspects of risk-benefit communication described in the project scope. This includes both generic terminology and specific types of communication such as media campaigns, framing, appearance-based information and behavioural counselling. Public and health practitioner attitudes, knowledge and understanding of the risk-benefits of sun-exposure are also captured within this concept. An additional, very focused, search line (line 56) was also used to retrieve any records missed by the two concept approach.

The MEDLINE strategy was adapted appropriately to run in the other information sources. Adaptation includes consideration of database interface differences as well as adaptation to different indexing languages. Due to the challenging search functionality of many of the search resources, in some cases it was necessary for the MEDLINE search strategy to be focused significantly for it to perform efficiently in some databases. In other smaller, more specialised resources it was possible to search more sensitively using only one concept; sunlight.

Database name	**MEDLINE and MEDLINE In-Process**
Database host	Ovid SP
Database coverage dates	1946 to current (updated daily)
Searcher	Hannah Wood
Search date	26/02/14
Search strategy checked by	Mick Arber (information specialist YHEC), Paul Levay (information specialist NICE)
Number of records retrieved	5433 (search 1 26/02/14) 552 (search 2 02/03/14)
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	Search 1: 5431 (2 records imported direct to Duplicates Library) Search 2: 45 (507 imported direct to Duplicates Library)
Reference numbers of records in EndNote library	1-5431, 11617-11661
Number of records after de-duplication in EndNote library	5468

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>
Search Strategy:

1 sunlight/ or ultraviolet rays/ or sunburn/ or sunbathing/ or suntan/ or exp sunscreening agents/ or sun protection factor/ (77655)
2 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab,kf. (10175)
3 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab,kf. (50803)
4 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab,kf. (12542)
5 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab,kf. (6525)
6 Melanoma/pc or Melanoma/px or exp Vitamin D Deficiency/pc or exp Vitamin D Deficiency/px or exp Skin Neoplasms/pc or exp Skin Neoplasms/px (6744)
7 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti. (20093)
8 (osteomalacia or rickets or hypovitaminosis D).ti. (5728)
9 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti. (10244)
10 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti. (78266)
11 or/1-10 (217836)
12 health communication/ or persuasive communication/ or communication barriers/ or communication/ (68186)
13 health promotion/ or health education/ or exp consumer health information/ or patient education as topic/mass me (164295)
14 communications media/ or exp mass media/ or pamphlteaching ets/ or electronic mail/ or exp teaching materials/ or exp educational technology/ or exp programmed instruction/ or exp telephone/ or exp internet/ or telecommunications/ or electronic mail/ (167738)
15 exp marketing/ or information dissemination/ or probability learning/ (40245)
16 Primary Prevention/ (13718)
17 counseling/ or exp directive counseling/ or behavior therapy/ or cognitive therapy/ or mentors/ or peer group/ (84030)
18 ed.fs. (215110)
19 health communication.jn. (843)
20 journal of health communication.jn. (1146)
21 ((risk$ or probabilit$ or uncertain$ or message$1 or communicat$ or marketing or advice or advise$ or advising or appeal$1 or loss or gain or positive$ or negative$) adj3 (frame or framed or framing)).ti,ab,kf. (788)
22 ((risk$ or probabilit$ or uncertain$) adj3 (notif$ or inform$ or message$1 or communicat$ or marketing or campaign$ or publiciz$ or publicis$ or publicity or advice or advise$ or advising or perceive$ or perception$)).ti,ab,kf. (20807)
23 ((tailor$ or personal$ or individual$ or targeted or targeting) adj3 (message$1 or material$1 or communica$ or feedback or feed back or promot$ or market$ or campaign$)).ti,ab,kf. (11805)
24 ((cognitive or cognition or associative or affective or positiv$ or negativ$) adj3 message$1).ti,ab,kf. (450)
25 (decision aid$1 or decision tool$1 or decision support$).ti,ab,kf. (8797)
26 ((shared or informed) adj3 (decision$1 or choice$1)).ti,ab,kf. (9034)

27 ((health$ or health care or lifestyle$ or life style$1 or consumer$1) adj2 (information or message$1 or communicat$)).ti,ab,kf. (23827)

28 (education$ adj2 (program$ or intervention$1 or meeting$1 or session$1 or strateg$ or workshop$1 or visit$ or material$1)).ti,ab,kf. (46155)

29 (behavio?r$ adj2 intervention$).ti,ab,kf. (7438)

30 (outreach or out reach).ti,ab,kf. (7715)

31 ((family or families or parent$ or care-giver$ or caregiver$ or carer or carers or guardian$ or wife or wives or husband or husbands or spouse$1 or spousal or partner or partners or mother$ or father$ or teacher$1) adj3 (led or educat$ or train$ or teach or teaches or teaching or taught or involv$ or intervention$ or program$ or session$1)).ti,ab,kf. (60428)

32 (work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community intervention$ or community program$ or community scheme$ or faith-based or faith-led or church-based or church-led).ti,ab,kf. (40048)

33 ((work or workplace$ or work place$ or employer$ or school$ or playschool$ or preschool$ or nursery or nurseries or kindergarten$ or creche$ or highschool$ or afterschool) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab,kf. (40392)

34 ((health$ worker$ or health-care worker$ or health$ professional$ or health-care professional$ or health$ personnel or health-care personnel or general-practitioner$ or gp or gps or nurse$1 or health visitor$1 or midwife or midwives or clinician$1 or pharmacist$ or primary care or general practice or family doctor$1 or family practi$ or dermatologist$1 or nutritionist$1) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab,kf. (54511)

35 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed or motivational) adj2 (advice or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$ or interview$)).ti,ab,kf. (24160)

36 ((community or consumer or pressure) adj (group$1 or organi?ation$1)).ti,ab,kf. (3582)

37 (coach$ or mentor$ or counsel$ or champion$ or self-study or self-guided).ti,ab,kf. (85759)

38 ((opinion or education$ or influential) adj1 leader$).ti,ab,kf. (1172)

39 ((group or peer) adj2 (educat$ or support$)).ti,ab,kf. (9984)

40 (pictogram$ or picto-gram$ or pictograph$ or picto-graph$ or infogram$ or info-gram$ or infographic$ or info-graphic$).ti,ab,kf. (277)

41 ((graphic$ or visual$ or pictorial or illustra$ or print$) adj3 (image$1 or stimuli or display$ or dissemin$ or present or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (6486)

42 ((data or statistic$ or graph or graphs or numeric$ or verbal or textual or written) adj3 (stimuli or display$1 or dissemin$ or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (3579)

43 ((story or stories or narrative$1 or testimon$ or first person) not narrative review$1).ti,ab,kf. (36417)

44 (mass media$ or new media$ or national media$ or local media$ or regional media$ or social media$ or social network$ or marketing or marketed or television$1 or tele-vision$1 or tv or advert$ or billboard$1 or bill-board$1 or poster$1 or cinema$ or video$1 or newspaper$1 or news or magazine$1 or journalis$ or comic$1 or cartoon$1 or leaflet$1 or pamphlet$1 or booklet$1 or workbook$1 or work-book$1 or handbook$1 or hand-book$1 or radio or radios or internet or multimedia or multi-media or web or website$ or interactive or inter-active or facebook or twitter or youtube or you-tube or mail$ out$1 or mailout$1 or mail-shot$1 or mailshot$1 or flyer$1).ti,ab,kf. (286299)

45 (phone$1 or telephone$1 or smartphone$1 or email$1 or e mail or electronic mail$1 or text messag$ or texting or sms or short messag$ or app or apps or android$ or blackberr$ or iphone$1 or ipad$1 or ehealth or e health or mhealth or m health or telehealth$ or tele-health$).ti,ab,kf. (75360)
46 (media$1 adj3 (coverage or report$ or article$ or content$ or present$ or discuss$ or messag$ or campaign$)).ti,ab,kf. (12205)
47 (appearance adj3 (based or focused or orientated)).ti,ab,kf. (973)
48 ((uv or ultra-violet or ultraviolet) adj4 (photo$1 or photograph$ or image$1 or imaging)).ti,ab,kf. (1276)
49 ((lifestyle$ or behavior$ or behaviour$) adj3 (change$ or changing or modification$ or modify$ or modifies)).ti,ab,kf. (52416)
50 "attitude of health personnel"/ or exp attitude to health/ or awareness/ (365804)
51 risk reduction behavior/ or risk-taking/ or motivation/ or intention/ or social desirability/ (80511)
52 professional-patient relations/ or nurse-patient relations/ or physician-patient relations/ (108749)
53 exp professional role/ (64878)
54 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab,kf. (81)
55 or/12-53 (1603908)
56 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab,kf. (1481)
57 (11 and 55) or (56 or 54) (8050)
58 exp animals/ not humans/ (3880949)
59 (news or editorial or letter or comment or historical article or case reports).pt. (3214096)
60 case report.ti. (155657)
61 57 not (58 or 59 or 60) (6778)
62 limit 61 to (english language and yr="1994 -Current") (5486)
63 remove duplicates from 62 (5433)

Search carried out 05/03/14 to add Health Behavior/ as a MeSH heading for concept 2

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>
Search Strategy:

1 Health Behavior/ (32187)
2 sunlight/ or ultraviolet rays/ or sunburn/ or sunbathing/ or suntan/ or exp sunscreening agents/ or sun protection factor/ (77707)
3 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab,kf. (10207)
4 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab,kf. (50867)
5 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab,kf. (12562)
6 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab,kf. (6533)
7 Melanoma/pc or Melanoma/px or exp Vitamin D Deficiency/pc or exp Vitamin D Deficiency/px or exp Skin Neoplasms/pc or exp Skin Neoplasms/px (6748)
8 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti. (20149)
9 (osteomalacia or rickets or hypovitaminosis D).ti. (5730)
10 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti. (10255)
11 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti. (78358)
12 or/2-11 (218108)
13 1 and 12 (650)
14 exp animals/ not humans/ (3882912)
15 (news or editorial or letter or comment or historical article or case reports).pt. (3217266)
16 case report.ti. (155867)
17 13 not (14 or 15 or 16) (594)
18 limit 17 to (english language and yr="1994 -Current") (552)

Database name	**Embase**
Database host	Ovid SP
Database coverage dates	1974 to 26 February 2014
Searcher	Hannah Wood
Search date	27/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	7668
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	4096 (3572 records imported direct to Duplicates Library)
Reference numbers of records in EndNote library	5432-9527
Number of records after de-duplication in EndNote library	3343

Database: Embase <1974 to 2014 February 26>
Search Strategy:

1 sunlight/ (11465)
2 sunburn/ (3698)
3 sunbathing/ (296)
4 suntan/ (67)
5 exp sunscreen/ (26254)
6 sun exposure/ (9042)
7 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab. (14132)
8 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab. (57770)
9 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab. (16529)
10 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab. (8757)
11 exp skin cancer/pc or skin tumors/pc (3501)
12 vitamin D deficiency/pc [Prevention] (903)
13 exp rickets/pc [Prevention] (695)
14 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti. (27520)
15 (osteomalacia or rickets or hypovitaminosis D).ti. (6619)
16 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti. (12916)
17 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti. (101120)
18 or/1-17 (251409)
19 medical information/ (50414)
20 persuasive communication/ (6506)
21 communication disorder/ (6905)
22 interpersonal communication/ (114806)
23 health education/ or health literacy/ or health promotion/ or parenting education/ or school health education/ or patient education/ (226091)
24 consumer health information/ (2296)
25 exp *mass communication/ (140604)
26 exp teaching/ (65861)
27 marketing/ (15543)
28 information dissemination/ (13993)
29 *primary prevention/ (5755)
30 social marketing/ (2597)
31 counseling/ or directive counseling/ or motivational interviewing/ or patient counseling/ or patient guidance/ or peer counseling/ (73453)
32 health communication.jn. (726)
33 journal of health communication.jn. (1130)
34 ((risk$ or probabilit$ or uncertain$ or message$1 or communicat$ or marketing or advice or advise$ or advising or appeal$1 or loss or gain or positive$ or negative$) adj3 (frame or framed or framing)).ti,ab. (938)
35 ((risk$ or probabilit$ or uncertain$) adj3 (notif$ or inform$ or message$1 or communicat$ or marketing or campaign$ or publiciz$ or publicis$ or publicity or advice or advise$ or advising or perceive$ or perception$)).ti,ab. (27672)

36 ((tailor$ or personal$ or individual$ or targeted or targeting) adj3 (message$1 or material$1 or communica$ or feedback or feed back or promot$ or market$ or campaign$)).ti,ab. (16015)
37 ((cognitive or cognition or associative or affective or positiv$ or negativ$) adj3 message$1).ti,ab. (513)
38 (decision aid$1 or decision tool$1 or decision support$).ti,ab. (11081)
39 ((shared or informed) adj3 (decision$1 or choice$1)).ti,ab. (11689)
40 ((health$ or health care or lifestyle$ or life style$1 or consumer$1) adj2 (information or message$1 or communicat$)).ti,ab. (29496)
41 (education$ adj2 (program$ or intervention$1 or meeting$1 or session$1 or strateg$ or workshop$1 or visit$ or material$1)).ti,ab. (60795)
42 (behavio?r$ adj2 intervention$).ti,ab. (9853)
43 (outreach or out reach).ti,ab. (9957)
44 ((family or families or parent$ or care-giver$ or caregiver$ or carer or carers or guardian$ or wife or wives or husband or husbands or spouse$1 or spousal or partner or partners or mother$ or father$ or teacher$1) adj3 (led or educat$ or train$ or teach or teaches or teaching or taught or involv$ or intervention$ or program$ or session$1)).ti,ab. (70572)
45 (work-based or workplace-based or worksite-based or community-led or community-based r community-wide or community-centred or community-centered or community-run or community intervention$ or community program$ or community scheme$ or faith-based or faith-led or church-based or church-led).ti,ab. (49322)
46 ((work or workplace$ or work place$ or employer$ or school$ or playschool$ or preschool$ or nursery or nurseries or kindergarten$ or creche$ or highschool$ or afterschool) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (51446)
47 ((health$ worker$ or health-care worker$ or health$ professional$ or health-care professional$ or health$ personnel or health-care personnel or general-practitioner$ or gp or gps or nurse$1 or health visitor$1 or midwife or midwives or clinician$1 or pharmacist$ or primary care or general practice or family doctor$1 or family practi$ or dermatologist$1 or nutritionist$1) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (70475)
48 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed or motivational) adj2 (advice or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$ or interview$)).ti,ab. (33345)
49 ((community or consumer or pressure) adj (group$1 or organi?ation$1)).ti,ab. (4451)
50 (coach$ or mentor$ or counsel$ or champion$ or self-study or self-guided).ti,ab. (113944)
51 ((opinion or education$ or influential) adj1 leader$).ti,ab. (1451)
52 ((group or peer) adj2 (educat$ or support$)).ti,ab. (13625)
53 (pictogram$ or picto-gram$ or pictograph$ or picto-graph$ or infogram$ or info-gram$ or infographic$ or info-graphic$).ti,ab. (447)
54 ((graphic$ or visual$ or pictorial or illustra$ or print$) adj3 (image$1 or stimuli or display$ or dissemin$ or present or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (7386)
55 ((data or statistic$ or graph or graphs or numeric$ or verbal or textual or written) adj3 (stimuli or display$1 or dissemin$ or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (4247)
56 ((story or stories or narrative$1 or testimon$ or first person) not narrative review$1).ti,ab. (44738)
57 (mass media$ or new media$ or national media$ or local media$ or regional media$ or social media$ or social network$ or marketing or marketed or

television$1 or tele-vision$1 or tv or advert$ or billboard$1 or bill-board$1 or poster$1 or cinema$ or video$1 or newspaper$1 or news or magazine$1 or journalis$ or comic$1 or cartoon$1 or leaflet$1 or pamphlet$1 or booklet$1 or workbook$1 or work-book$1 or handbook$1 or hand-book$1 or radio or radios or internet or multimedia or multi-media or web or website$ or interactive or inter-active or facebook or twitter or youtube or you-tube or mail$ out$1 or mailout$1 or mail-shot$1 or mailshot$1 or flyer$1).ti,ab. (375469)

58 (phone$1 or telephone$1 or smartphone$1 or email$1 or e mail or electronic mail$1 or text messag$ or texting or sms or short messag$ or app or apps or android$ or blackberr$ or iphone$1 or ipad$1 or ehealth or e health or mhealth or m health or telehealth$ or tele-health$).ti,ab. (104095)

59 (media$1 adj3 (coverage or report$ or article$ or content$ or present$ or discuss$ or messag$ or campaign$)).ti,ab. (17671)

60 (appearance adj3 (based or focused or orientated)).ti,ab. (1174)

61 ((uv or ultra-violet or ultraviolet) adj4 (photo$1 or photograph$ or image$1 or imaging)).ti,ab. (1236)

62 ((lifestyle$ or behavior$ or behavior$) adj3 (change$ or changing or modification$ or modify$ or modifies)).ti,ab. (68212)

63 health behavior/ or attitude to health/ or harm reduction/ or health belief/ or high risk behavior/ (140654)

64 exp health personnel attitude/ (133391)

65 awareness/ (32778)

66 motivation/ (70209)

67 social desirability/ (3887)

68 doctor patient relation/ or nurse patient relation/ (111428)

69 patient attitude/ or patient compliance/ (142801)

70 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab. (100)

71 or/19-69 (1835926)

72 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab. (1954)

73 (18 and 71) or (72 or 70) (10578)

74 (animal experiment/ or animal model/ or nonhuman/) not human/ (3740023)

75 (editorial or letter or note).pt. (1928525)

76 case report/ (2026088)

77 case report.ti. (204600)

78 73 not (74 or 75 or 76 or 77) (9013)

79 limit 78 to (english language and yr="1994 -Current") (7668)

Database name	Cochrane Database of Systematic Reviews (CDSR)
Database host	Cochrane Library, Wiley
Database coverage dates	Issue 2 of 12 February 2014
Searcher	Hannah Wood
Search date	27/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	57
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	55 (2 records imported direct to Duplicates Library)
Reference numbers of records in EndNote library	9528-9582
Number of records after de-duplication in EndNote library	52

Search Name:
Date Run: 27/02/14 16:50:44.920
Description:

ID	Search	Hits
#1	[mh ^sunlight]	240
#2	[mh ^"ultraviolet rays"]	511
#3	[mh ^sunburn]	149
#4	[mh ^Sunbathing]	17
#5	[mh ^Suntan]	4
#6	[mh "Sunscreening agents"]	212
#7	[mh ^"Sun Protection Factor"]	6
#8	((sun or suns or sunning or sunshine or sunlight*) near/3 (damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose* or underexpose* or underexposure*)):ti,ab	510
#9	((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) near/3 (ray* or radiation or irradiat* or damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose*)):ti,ab	952
#10	(sunscreen* or sun-screen* or sunblock* or sun-block* or spf or sunburn* or sun-burn* or photo-damag* or photodamag* or photoag* or photo-ag* or photo-expos* or photoexpos*):ti,ab	808
#11	(sunbath* or sun-bath* or suntan* or tan or tans or tanning or tanned or sunbed* or sun-bed* or sunlamp* or sun-lamp* or solarium* or solaria*):ti,ab	345
#12	MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Prevention & control - PC, Psychology - PX]	81
#13	MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Prevention & control - PC, Psychology - PX]	112
#14	MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Prevention & control - PC, Psychology - PX]	261
#15	(vitaminD* or "vitamin D" or cholecalciferol* or colecalciferol* or ergocalciferol* or calciferol* or alfacalcidol*):ti	1460
#16	(osteomalacia or rickets or "hypovitaminosis D"):ti	88
#17	((skin or skins) near/3 (cancer* or neoplasm* or tumor* or tumour* or carcinoma* or malignan*)):ti	234
#18	(melanoma* or basal next cell next carcinoma* or squamous next cell next carcinoma*):ti	2701near.
#19	[or #1-#18]	6586
#20	#19 from 1994 to 2014, in Cochrane Reviews (Reviews and Protocols)	57

Database name	Database of Abstracts of Reviews of Effectiveness (DARE)
Database host	Cochrane Library, Wiley
Database coverage dates	Issue 1 of 4 January 2014
Searcher	Hannah Wood
Search date	28/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	320
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	319 (1 record imported direct to Duplicates Library)
Reference numbers of records in EndNote library	9583-9901
Number of records after de-duplication in EndNote library	280

Search Name:
Date Run: 28/02/14 11:25:09.420
Description:

ID	Search	Hits
#1	MeSH descriptor: [Sunlight] this term only	240
#2	MeSH descriptor: [Ultraviolet Rays] this term only	511
#3	MeSH descriptor: [Sunburn] this term only	149
#4	MeSH descriptor: [Sunbathing] this term only	17
#5	MeSH descriptor: [Suntan] this term only	4
#6	MeSH descriptor: [Sunscreening Agents] explode all trees	212
#7	MeSH descriptor: [Sun Protection Factor] this term only	6
#8	(sun or suns or sunning or sunshine or sunlight*) near/3 (damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose* or underexpose* or underexposure*)	643
#9	(uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) near/3 (ray* or radiation or irradiat* or damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose*)	1433
#10	sunscreen* or sun-screen* or sunblock* or sun-block* or spf or sunburn* or sun-burn* or photo-damag* or photodamag* or photoag* or photo-ag* or photo-expos* or photoexpos*	970
#11	sunbath* or sun-bath* or suntan* or tan or tans or tanning or tanned or sunbed* or sun-bed* or sunlamp* or sun-lamp* or solarium* or solaria*	3467
#12	MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Prevention & control - PC]	54
#13	MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Psychology - PX]	32
#14	MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Prevention & control - PC]	110
#15	MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Psychology - PX]	2
#16	MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Prevention & control - PC]	243
#17	MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Psychology - PX]	30
#18	(vitaminD* or "vitamin D" or cholecalciferol* or colecalciferol* or ergocalciferol* or calciferol* or alfacalcidol*):ti	1460
#19	(osteomalacia or rickets or "hypovitaminosis D"):ti	88

#20 ((skin or skins) near/3 (cancer* or neoplasm* or tumor* or tumour* or carcinoma* or malignan*)):ti 234
#21 (melanoma* or basal next cell next carcinoma* or squamous next cell next carcinoma*):ti 2701
#22 [or #1-#21] 9970
#23 [mh ^"health communication"] 23
#24 [mh ^"persuasive communication"] 190
#25 [mh ^"communication barriers"] 76
#26 [mh ^communication] 1262
#27 [mh ^"health promotion"] 3328
#28 [mh ^"health education"] 2750
#29 [mh "consumer health information"] 125
#30 [mh ^"patient education as topic"] 6065
#31 [mh ^"communications media"] 17
#32 [mh "mass media"] 1398
#33 [mh ^pamphlets] 572
#34 [mh ^"electronic mail"] 168
#35 [mh "teaching materials"] 2710
#36 [mh "educational technology"] 2305
#37 [mh "programmed instruction"] 0
#38 [mh telephone] 1552
#39 [mh internet] 1525
#40 [mh ^telecommunications] 81
#41 [mh ^"electronic mail"] 168
#42 [mh marketing] 307
#43 [mh ^"information dissemination"] 157
#44 [mh ^"probability learning"] 42
#45 [mh ^"Primary Prevention"] 736
#46 [mh ^counseling] 2691
#47 [mh "directive counseling"] 275
#48 [mh ^"behavior therapy"] 3389
#49 [mh ^"cognitive therapy"] 4418
#50 [mh ^mentors] 107
#51 [mh ^"peer group"] 750
#52 Any MeSH descriptor with qualifier(s): [Education - ED] 4709
#53 "health communication":so 127
#54 (risk* or probabilit* or uncertain* or message* or communicat* or marketing or advice or advise* or advising or appeal* or loss or gain or positive* or negative*) near/3 (frame or framed or framing) 175
#55 (risk* or probabilit* or uncertain*) near/3 (notif* or inform* or message* or communicat* or marketing or campaign* or publiciz* or publicis* or publicity or advice or advise* or advising or perceive* or perception*) 3504
#56 (tailor* or personal* or individual* or targeted or targeting) near/3 (message* or material* or communica* or feedback or feed-back or promot* or market* or campaign*) 2717
#57 (cognitive or cognition or associative or affective or positiv* or negativ*) near/3 message* 53
#58 decision next aid* or decision next tool* or decision next support* 2398
#59 (shared or informed) near/3 (decision* or choice*) 1499
#60 (health* or health-care or lifestyle* or life-style* or consumer*) near/2 (information or message* or communicat*) 2471
#61 education* near/2 (program* or intervention* or meeting* or session* or strateg* or workshop* or visit* or material*) 8694
#62 behavio*r* near/2 intervention* 3248
#63 outreach or "out reach" 1018
#64 (family or families or parent* or care-giver* or caregiver* or carer or carers or guardian* or wife or wives or husband or husbands or spouse* or spousal or partner

or partners or mother* or father* or teacher*) near/3 (led or educat* or train* or teach or teaches or teaching or taught or involv* or intervention* or program* or session*) 8086

#65 work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community next intervention* or community next program* or community next scheme* or faith-based or faith-led or church-based or church-led 4931

#66 (work or workplace* or work-place* or employer* or school* or playschool* or preschool* or nursery or nurseries or kindergarten* or creche* or highschool* or afterschool) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 10170

#67 (health* next worker* or health-care next worker* or health* next professional* or health-care next professional* or health* next personnel or health-care next personnel or general-practitioner* or gp or gps or nurse* or health next visitor* or midwife or midwives or clinician* or pharmacist* or "primary care" or "general practice" or family next doctor* or family next practi* or dermatologist* or nutritionist*) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 7933

#68 (brief or opportunist* or concise or short or direct or lifestyle or written or oral or verbal or personali*ed or individuali*ed or motivational) near/2 (advice or negotiation* or guidance or discussion* or encouragement or intervention* or program* or meeting* or session* or interview*) 8149

#69 (community or consumer or pressure) next (group* or organi*ation*) 440

#70 coach* or mentor* or counsel* or champion* or self-study or self-guided 12066

#71 (opinion or education* or influential) near/2 leader* 215

#72 (group or peer) near/2 (educat* or support*) 4057

#73 pictogram* or picto-gram* or pictograph* or picto-graph* or infogram* or info-gram* or infographic* or info-graphic* 52

#74 ((graphic* or visual* or pictorial or illustra* or print*) near/3 (image* or stimuli or display* or dissemin* or present or presented or presentation* or communicat* or message* or advice or feedback or feed-back or inform or information or aid or aids or representation* or material*)):ti 398

#75 ((data or statistic* or graph or graphs or numeric* or verbal or textual or written) near/3 (stimuli or display* or dissemin* or presented or presentation* or communicat* or message* or advice or feedback or feed back or inform or information or aid or aids or representation* or material*)):ti 254

#76 (story or stories or narrative* or testimon* or "first person") not (narrative next review*) 7760

#77 mass next media* or new next media* or national next media* or local next media* or regional next media* or social next media* or social next network* or marketing or marketed or television* or tele-vision* or tv or advert* or billboard* or bill-board* or poster* or cinema* or video* or newspaper* or news or magazine* or journalis* or comic* or cartoon* or leaflet* or pamphlet* or booklet* or workbook* or work-book* or handbook* or hand-book* or radio or radios or internet or multimedia or multi-media or web or website* or interactive or inter-active or facebook or twitter or youtube or you-tube or mail* next out* or mailout* or mail-shot* or mailshot* or flyer* 44109

#78 phone* or telephone* or smartphone* or email* or e-mail or electronic next mail* or text next messag* or texting or sms or short next messag* or app or apps or android* or blackberr* or iphone* or ipad* or ehealth or e-health or mhealth or m-health or telehealth* or tele-health* 63436

#79 media* near/3 (coverage or report* or article* or content* or present* or discuss* or messag* or campaign*) 3144

#80 appearance near/3 (based or focused or orientated) 70

#81 (uv or ultra-violet or ultraviolet) near/4 (photo* or photograph* or image* or imaging) 302

#82 (lifestyle* or behavior* or behaviour*) near/3 (change* or changing or modification* or modify* or modifies) 7043
#83 [mh ^"attitude of health personnel"] 1304
#84 [mh "attitude to health"] 22747
#85 [mh ^awareness] 671
#86 [mh ^"risk reduction behavior"] 918
#87 [mh ^risk-taking] 839
#88 [mh ^motivation] 2793
#89 [mh ^intention] 354
#90 [mh ^"social desirability"] 166
#91 [mh "professional-patient relations"] 1841
#92 [mh "professional role"] 576
#93 [or #23-#92] 162913
#94 #22 and #93 2529
#95 skinsafe* or sunsafe* or sunsmart* or sunwise* or "pool cool" or kidskin or "kid skin" or slipslopslap or "slip slop slap" or shunburn or "shun burn" 24
#96 (sun or suns or sunning or sunshine or sunlight* or sunbath* or suntan* or sunbed* or sunlamp* or sunscreen* or sunblock* or solarium* or solaria* or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) near/5 (risk* or benefit* or protect* or exposure* or safe*) near/5 (knowledg* or attitude* or behavio* or value* or understand* or belief* or believe or perception* or perceive* or view or views or prefer* or intention* or habit* or practice* or comply or complies or compliance or adhere* or adherence or concordance or accordance or accept* or motivation* or awareness* or uptake or up-take or takeup or take-up or barrier* or facilitator* or utilis* or utiliz*) 175
#97 #95 or #96 181
#98 #97 or #94 2559
#99 #98 from 1994 to 2014, in Other Reviews 320

Database name	**NHS Economic Evaluation Database (NHS EED)**
Database host	Cochrane Library, Wiley
Database coverage dates	Issue 1 of 4 January 2014
Searcher	Hannah Wood
Search date	28/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	95
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	95
Reference numbers of records in EndNote library	9902-9996
Number of records after de-duplication in EndNote library	84

Search Name:
Date Run: 28/02/14 11:25:09.420
Description:

ID	Search	Hits
#1	MeSH descriptor: [Sunlight] this term only	240
#2	MeSH descriptor: [Ultraviolet Rays] this term only	511
#3	MeSH descriptor: [Sunburn] this term only	149
#4	MeSH descriptor: [Sunbathing] this term only	17
#5	MeSH descriptor: [Suntan] this term only	4
#6	MeSH descriptor: [Sunscreening Agents] explode all trees	212
#7	MeSH descriptor: [Sun Protection Factor] this term only	6
#8	(sun or suns or sunning or sunshine or sunlight*) near/3 (damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose* or underexpose* or underexposure*)	643
#9	(uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) near/3 (ray* or radiation or irradiat* or damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose*)	1433
#10	sunscreen* or sun-screen* or sunblock* or sun-block* or spf or sunburn* or sun-burn* or photo-damag* or photodamag* or photoag* or photo-ag* or photo-expos* or photoexpos*	970
#11	sunbath* or sun-bath* or suntan* or tan or tans or tanning or tanned or sunbed* or sun-bed* or sunlamp* or sun-lamp* or solarium* or solaria*	3467
#12	MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Prevention & control - PC]	54
#13	MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Psychology - PX]	32
#14	MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Prevention & control - PC]	110
#15	MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Psychology - PX]	2
#16	MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Prevention & control - PC]	243
#17	MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Psychology - PX]	30
#18	(vitaminD* or "vitamin D" or cholecalciferol* or colecalciferol* or ergocalciferol* or calciferol* or alfacalcidol*):ti	1460
#19	(osteomalacia or rickets or "hypovitaminosis D"):ti	88
#20	((skin or skins) near/3 (cancer* or neoplasm* or tumor* or tumour* or carcinoma* or malignan*)):ti	234
#21	(melanoma* or basal next cell next carcinoma* or squamous next cell next carcinoma*):ti	2701
#22	[or #1-#21]	9970
#23	[mh ^"health communication"]	23
#24	[mh ^"persuasive communication"]	190
#25	[mh ^"communication barriers"]	76
#26	[mh ^communication]	1262
#27	[mh ^"health promotion"]	3328
#28	[mh ^"health education"]	2750
#29	[mh "consumer health information"]	125
#30	[mh ^"patient education as topic"]	6065
#31	[mh ^"communications media"]	17
#32	[mh "mass media"]	1398
#33	[mh ^pamphlets]	572
#34	[mh ^"electronic mail"]	168
#35	[mh "teaching materials"]	2710

#36 [mh "educational technology"] 2305
#37 [mh "programmed instruction"] 0
#38 [mh telephone] 1552
#39 [mh internet] 1525
#40 [mh ^telecommunications] 81
#41 [mh ^"electronic mail"] 168
#42 [mh marketing] 307
#43 [mh ^"information dissemination"] 157
#44 [mh ^"probability learning"] 42
#45 [mh ^"Primary Prevention"] 736
#46 [mh ^counseling] 2691
#47 [mh "directive counseling"] 275
#48 [mh ^"behavior therapy"] 3389
#49 [mh ^"cognitive therapy"] 4418
#50 [mh ^mentors] 107
#51 [mh ^"peer group"] 750
#52 Any MeSH descriptor with qualifier(s): [Education - ED] 4709
#53 "health communication":so 127
#54 (risk* or probabilit* or uncertain* or message* or communicat* or marketing or advice or advise* or advising or appeal* or loss or gain or positive* or negative*) near/3 (frame or framed or framing) 175
#55 (risk* or probabilit* or uncertain*) near/3 (notif* or inform* or message* or communicat* or marketing or campaign* or publiciz* or publicis* or publicity or advice or advise* or advising or perceive* or perception*) 3504
#56 (tailor* or personal* or individual* or targeted or targeting) near/3 (message* or material* or communica* or feedback or feed-back or promot* or market* or campaign*) 2717
#57 (cognitive or cognition or associative or affective or positiv* or negativ*) near/3 message* 53
#58 decision next aid* or decision next tool* or decision next support* 2398
#59 (shared or informed) near/3 (decision* or choice*) 1499
#60 (health* or health-care or lifestyle* or life-style* or consumer*) near/2 (information or message* or communicat*) 2471
#61 education* near/2 (program* or intervention* or meeting* or session* or strateg* or workshop* or visit* or material*) 8694
#62 behavio*r* near/2 intervention* 3248
#63 outreach or "out reach" 1018
#64 (family or families or parent* or care-giver* or caregiver* or carer or carers or guardian* or wife or wives or husband or husbands or spouse* or spousal or partner or partners or mother* or father* or teacher*) near/3 (led or educat* or train* or teach or teaches or teaching or taught or involv* or intervention* or program* or session*) 8086
#65 work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community next intervention* or community next program* or community next scheme* or faith-based or faith-led or church-based or church-led 4931
#66 (work or workplace* or work-place* or employer* or school* or playschool* or preschool* or nursery or nurseries or kindergarten* or creche* or highschool* or afterschool) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 10170
#67 (health* next worker* or health-care next worker* or health* next professional* or health-care next professional* or health* next personnel or health-care next personnel or general-practitioner* or gp or gps or nurse* or health next visitor* or midwife or midwives or clinician* or pharmacist* or "primary care" or "general practice" or family next doctor* or family next practi* or dermatologist* or

nutritionist*) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 7933

#68 (brief or opportunist* or concise or short or direct or lifestyle or written or oral or verbal or personali*ed or individuali*ed or motivational) near/2 (advice or negotiation* or guidance or discussion* or encouragement or intervention* or program* or meeting* or session* or interview*) 8149

#69 (community or consumer or pressure) next (group* or organi*ation*) 440

#70 coach* or mentor* or counsel* or champion* or self-study or self-guided 12066

#71 (opinion or education* or influential) near/2 leader* 215

#72 (group or peer) near/2 (educat* or support*) 4057

#73 pictogram* or picto-gram* or pictograph* or picto-graph* or infogram* or info-gram* or infographic* or info-graphic* 52

#74 ((graphic* or visual* or pictorial or illustra* or print*) near/3 (image* or stimuli or display* or dissemin* or present or presented or presentation* or communicat* or message* or advice or feedback or feed-back or inform or information or aid or aids or representation* or material*)):ti 398

#75 ((data or statistic* or graph or graphs or numeric* or verbal or textual or written) near/3 (stimuli or display* or dissemin* or presented or presentation* or communicat* or message* or advice or feedback or feed back or inform or information or aid or aids or representation* or material*)):ti 254

#76 (story or stories or narrative* or testimon* or "first person") not (narrative next review*) 7760

#77 mass next media* or new next media* or national next media* or local next media* or regional next media* or social next media* or social next network* or marketing or marketed or television* or tele-vision* or tv or advert* or billboard* or bill-board* or poster* or cinema* or video* or newspaper* or news or magazine* or journalis* or comic* or cartoon* or leaflet* or pamphlet* or booklet* or workbook* or work-book* or handbook* or hand-book* or radio or radios or internet or multimedia or multi-media or web or website* or interactive or inter-active or facebook or twitter or youtube or you-tube or mail* next out* or mailout* or mail-shot* or mailshot* or flyer* 44109

#78 phone* or telephone* or smartphone* or email* or e-mail or electronic next mail* or text next messag* or texting or sms or short next messag* or app or apps or android* or blackberr* or iphone* or ipad* or ehealth or e-health or mhealth or m-health or telehealth* or tele-health* 63436

#79 media* near/3 (coverage or report* or article* or content* or present* or discuss* or messag* or campaign*) 3144

#80 appearance near/3 (based or focused or orientated) 70

#81 (uv or ultra-violet or ultraviolet) near/4 (photo* or photograph* or image* or imaging) 302

#82 (lifestyle* or behavior* or behaviour*) near/3 (change* or changing or modification* or modify* or modifies) 7043

#83 [mh ^"attitude of health personnel"] 1304

#84 [mh "attitude to health"] 22747

#85 [mh ^awareness] 671

#86 [mh ^"risk reduction behavior"] 918

#87 [mh ^risk-taking] 839

#88 [mh ^motivation] 2793

#89 [mh ^intention] 354

#90 [mh ^"social desirability"] 166

#91 [mh "professional-patient relations"] 1841

#92 [mh "professional role"] 576

#93 [or #23-#92] 162913

#94 #22 and #93 2529

#95 skinsafe* or sunsafe* or sunsmart* or sunwise* or "pool cool" or kidskin or "kid skin" or slipslopslap or "slip slop slap" or shunburn or "shun burn" 24

#96 (sun or suns or sunning or sunshine or sunlight* or sunbath* or suntan* or sunbed* or sunlamp* or sunscreen* or sunblock* or solarium* or solaria* or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) near/5 (risk* or benefit* or protect* or exposure* or safe*) near/5 (knowledg* or attitude* or behavio* or value* or understand* or belief* or believe or perception* or perceive* or view or views or prefer* or intention* or habit* or practice* or comply or complies or compliance or adhere* or adherence or concordance or accordance or accept* or motivation* or awareness* or uptake or up-take or takeup or take-up or barrier* or facilitator* or utilis* or utiliz*) 175
#97 #95 or #96 181
#98 #97 or #94 2559
#99 #98 from 1994 to 2014, in Economic Evaluations 95

Database name	**Cochrane Central Register of Controlled Trials (CENTRAL)**
Database host	Cochrane Library, Wiley
Database coverage dates	Issue 1 of12 January 2014
Searcher	Hannah Wood
Search date	28/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	1471
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	1091 (380 direct to duplicate Library)
Reference numbers of records in EndNote library	10322 - 11412
Number of records after de-duplication in EndNote library	954

Search Name:
Date Run: 28/02/14 11:25:09.420
Description:

ID Search Hits
#1 MeSH descriptor: [Sunlight] this term only 240
#2 MeSH descriptor: [Ultraviolet Rays] this term only 511
#3 MeSH descriptor: [Sunburn] this term only 149
#4 MeSH descriptor: [Sunbathing] this term only 17
#5 MeSH descriptor: [Suntan] this term only 4
#6 MeSH descriptor: [Sunscreening Agents] explode all trees 212
#7 MeSH descriptor: [Sun Protection Factor] this term only 6
#8 (sun or suns or sunning or sunshine or sunlight*) near/3 (damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose* or underexpose* or underexposure*) 643
#9 (uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) near/3 (ray* or radiation or irradiat* or damag* or protect* or safe or safety or risk* or benefit* or beneficial or index or indexes or exposure* or overexposure* or expose* or overexpose*) 1433
#10 sunscreen* or sun-screen* or sunblock* or sun-block* or spf or sunburn* or sun-burn* or photo-damag* or photodamag* or photoag* or photo-ag* or photo-expos* or photoexpos* 970
#11 sunbath* or sun-bath* or suntan* or tan or tans or tanning or tanned or sunbed* or sun-bed* or sunlamp* or sun-lamp* or solarium* or solaria* 3467
#12 MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Prevention & control - PC] 54
#13 MeSH descriptor: [Melanoma] this term only and with qualifier(s): [Psychology - PX] 32

#14 MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Prevention & control - PC] 110
#15 MeSH descriptor: [Vitamin D Deficiency] explode all trees and with qualifier(s): [Psychology - PX] 2
#16 MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Prevention & control - PC] 243
#17 MeSH descriptor: [Skin Neoplasms] explode all trees and with qualifier(s): [Psychology - PX] 30
#18 (vitaminD* or "vitamin D" or cholecalciferol* or colecalciferol* or ergocalciferol* or calciferol* or alfacalcidol*):ti 1460
#19 (osteomalacia or rickets or "hypovitaminosis D"):ti 88
#20 ((skin or skins) near/3 (cancer* or neoplasm* or tumor* or tumour* or carcinoma* or malignan*)):ti 234
#21 (melanoma* or basal next cell next carcinoma* or squamous next cell next carcinoma*):ti 2701
#22 [or #1-#21] 9970
#23 [mh ^"health communication"] 23
#24 [mh ^"persuasive communication"] 190
#25 [mh ^"communication barriers"] 76
#26 [mh ^communication] 1262
#27 [mh ^"health promotion"] 3328
#28 [mh ^"health education"] 2750
#29 [mh "consumer health information"] 125
#30 [mh ^"patient education as topic"] 6065
#31 [mh ^"communications media"] 17
#32 [mh "mass media"] 1398
#33 [mh ^pamphlets] 572
#34 [mh ^"electronic mail"] 168
#35 [mh "teaching materials"] 2710
#36 [mh "educational technology"] 2305
#37 [mh "programmed instruction"] 0
#38 [mh telephone] 1552
#39 [mh internet] 1525
#40 [mh ^telecommunications] 81
#41 [mh ^"electronic mail"] 168
#42 [mh marketing] 307
#43 [mh ^"information dissemination"] 157
#44 [mh ^"probability learning"] 42
#45 [mh ^"Primary Prevention"] 736
#46 [mh ^counseling] 2691
#47 [mh "directive counseling"] 275
#48 [mh ^"behavior therapy"] 3389
#49 [mh ^"cognitive therapy"] 4418
#50 [mh ^mentors] 107
#51 [mh ^"peer group"] 750
#52 Any MeSH descriptor with qualifier(s): [Education - ED] 4709
#53 "health communication":so 127
#54 (risk* or probabilit* or uncertain* or message* or communicat* or marketing or advice or advise* or advising or appeal* or loss or gain or positive* or negative*) near/3 (frame or framed or framing) 175
#55 (risk* or probabilit* or uncertain*) near/3 (notif* or inform* or message* or communicat* or marketing or campaign* or publiciz* or publicis* or publicity or advice or advise* or advising or perceive* or perception*) 3504
#56 (tailor* or personal* or individual* or targeted or targeting) near/3 (message* or material* or communica* or feedback or feed-back or promot* or market* or campaign*) 2717

#57 (cognitive or cognition or associative or affective or positiv* or negativ*) near/3 message* 53
#58 decision next aid* or decision next tool* or decision next support* 2398
#59 (shared or informed) near/3 (decision* or choice*) 1499
#60 (health* or health-care or lifestyle* or life-style* or consumer*) near/2 (information or message* or communicat*) 2471
#61 education* near/2 (program* or intervention* or meeting* or session* or strateg* or workshop* or visit* or material*) 8694
#62 behavio*r* near/2 intervention* 3248
#63 outreach or "out reach" 1018
#64 (family or families or parent* or care-giver* or caregiver* or carer or carers or guardian* or wife or wives or husband or husbands or spouse* or spousal or partner or partners or mother* or father* or teacher*) near/3 (led or educat* or train* or teach or teaches or teaching or taught or involv* or intervention* or program* or session*) 8086
#65 work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community next intervention* or community next program* or community next scheme* or faith-based or faith-led or church-based or church-led 4931
#66 (work or workplace* or work-place* or employer* or school* or playschool* or preschool* or nursery or nurseries or kindergarten* or creche* or highschool* or afterschool) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 10170
#67 (health* next worker* or health-care next worker* or health* next professional* or health-care next professional* or health* next personnel or health-care next personnel or general-practitioner* or gp or gps or nurse* or health next visitor* or midwife or midwives or clinician* or pharmacist* or "primary care" or "general practice" or family next doctor* or family next practi* or dermatologist* or nutritionist*) near/3 (led or educat* or train* or teach* or involv* or intervention* or program* or session*) 7933
#68 (brief or opportunist* or concise or short or direct or lifestyle or written or oral or verbal or personali*ed or individuali*ed or motivational) near/2 (advice or negotiation* or guidance or discussion* or encouragement or intervention* or program* or meeting* or session* or interview*) 8149
#69 (community or consumer or pressure) next (group* or organi*ation*) 440
#70 coach* or mentor* or counsel* or champion* or self-study or self-guided 12066
#71 (opinion or education* or influential) near/2 leader* 215
#72 (group or peer) near/2 (educat* or support*) 4057
#73 pictogram* or picto-gram* or pictograph* or picto-graph* or infogram* or info-gram* or infographic* or info-graphic* 52
#74 ((graphic* or visual* or pictorial or illustra* or print*) near/3 (image* or stimuli or display* or dissemin* or present or presented or presentation* or communicat* or message* or advice or feedback or feed-back or inform or information or aid or aids or representation* or material*)):ti 398
#75 ((data or statistic* or graph or graphs or numeric* or verbal or textual or written) near/3 (stimuli or display* or dissemin* or presented or presentation* or communicat* or message* or advice or feedback or feed back or inform or information or aid or aids or representation* or material*)):ti 254
#76 (story or stories or narrative* or testimon* or "first person") not (narrative next review*) 7760
#77 mass next media* or new next media* or national next media* or local next media* or regional next media* or social next media* or social next network* or marketing or marketed or television* or tele-vision* or tv or advert* or billboard* or bill-board* or poster* or cinema* or video* or newspaper* or news or magazine* or journalis* or comic* or cartoon* or leaflet* or pamphlet* or booklet* or workbook* or work-book* or handbook* or hand-book* or radio or radios or internet or multimedia or multi-

media or web or website* or interactive or inter-active or facebook or twitter or youtube or you-tube or mail* next out* or mailout* or mail-shot* or mailshot* or flyer* 44109

#78 phone* or telephone* or smartphone* or email* or e-mail or electronic next mail* or text next messag* or texting or sms or short next messag* or app or apps or android* or blackberr* or iphone* or ipad* or ehealth or e-health or mhealth or m-health or telehealth* or tele-health* 63436

#79 media* near/3 (coverage or report* or article* or content* or present* or discuss* or messag* or campaign*) 3144

#80 appearance near/3 (based or focused or orientated) 70

#81 (uv or ultra-violet or ultraviolet) near/4 (photo* or photograph* or image* or imaging) 302

#82 (lifestyle* or behavior* or behaviour*) near/3 (change* or changing or modification* or modify* or modifies) 7043

#83 [mh ^"attitude of health personnel"] 1304

#84 [mh "attitude to health"] 22747

#85 [mh ^awareness] 671

#86 [mh ^"risk reduction behavior"] 918

#87 [mh ^risk-taking] 839

#88 [mh ^motivation] 2793

#89 [mh ^intention] 354

#90 [mh ^"social desirability"] 166

#91 [mh "professional-patient relations"] 1841

#92 [mh "professional role"] 576

#93 [or #23-#92] 162913

#94 #22 and #93 2529

#95 skinsafe* or sunsafe* or sunsmart* or sunwise* or "pool cool" or kidskin or "kid skin" or slipslopslap or "slip slop slap" or shunburn or "shun burn" 24

#96 (sun or suns or sunning or sunshine or sunlight* or sunbath* or suntan* or sunbed* or sunlamp* or sunscreen* or sunblock* or solarium* or solaria* or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) near/5 (risk* or benefit* or protect* or exposure* or safe*) near/5 (knowledg* or attitude* or behavio* or value* or understand* or belief* or believe or perception* or perceive* or view or views or prefer* or intention* or habit* or practice* or comply or complies or compliance or adhere* or adherence or concordance or accordance or accept* or motivation* or awareness* or uptake or up-take or takeup or take-up or barrier* or facilitator* or utilis* or utiliz*) 175

#97 #95 or #96 181

#98 #97 or #94 2559

#99 #98 from 1994 to 2014, in Trials 1471

Database name	**EconLit**
Database host	Ovid SP
Database coverage dates	1886 – January 2014
Searcher	Hannah Wood
Search date	28/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	33
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	32 (1 direct to duplicate Library)
Reference numbers of records in EndNote library	9997-10028
Number of records after de-duplication in EndNote library	32

Database: Econlit <1886 to January 2014>
Search Strategy:

1	((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab. (11)
2	((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab. (73)
3	(sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab. (69)
4	(sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab. (137)
5	(vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti,ab. (20)
6	(osteomalacia or rickets or hypovitaminosis D).ti,ab. (3)
7	((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti,ab. (19)
8	(melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti,ab. (12)
9	((risk$ or probabilit$ or uncertain$ or message$1 or communicat$ or marketing or advice or advise$ or advising or appeal$1 or loss or gain or positive$ or negative$) adj3 (frame or framed or framing)).ti,ab. (193)
10	((risk$ or probabilit$ or uncertain$) adj3 (notif$ or inform$ or message$1 or communicat$ or marketing or campaign$ or publiciz$ or publicis$ or publicity or advice or advise$ or advising or perceive$ or perception$)).ti,ab. (3854)
11	((tailor$ or personal$ or individual$ or targeted or targeting) adj3 (message$1 or material$1 or communica$ or feedback or feed back or promot$ or market$ or campaign$)).ti,ab. (2003)
12	((cognitive or cognition or associative or affective or positiv$ or negativ$) adj3 message$1).ti,ab. (30)
13	(decision aid$1 or decision tool$1 or decision support$).ti,ab. (1067)
14	((shared or informed) adj3 (decision$1 or choice$1)).ti,ab. (404)
15	((health$ or health care or lifestyle$ or life style$1 or consumer$1) adj2 (information or message$1 or communicat$)).ti,ab. (1076)
16	(education$ adj2 (program$ or intervention$1 or meeting$1 or session$1 or strateg$ or workshop$1 or visit$ or material$1)).ti,ab. (956)
17	(behavio?r$ adj2 intervention$).ti,ab. (57)
18	(outreach or out reach).ti,ab. (429)
19	((family or families or parent$ or care-giver$ or caregiver$ or carer or carers or guardian$ or wife or wives or husband or husbands or spouse$1 or spousal or partner or partners or mother$ or father$ or teacher$1) adj3 (led or educat$ or train$ or teach or teaches or teaching or taught or involv$ or intervention$ or program$ or session$1)).ti,ab. (3301)
20	(work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community intervention$ or community program$ or community scheme$ or faith-based or faith-led or church-based or church-led).ti,ab. (1490)
21	((work or workplace$ or work place$ or employer$ or school$ or playschool$ or preschool$ or nursery or nurseries or kindergarten$ or creche$ or highschool$ or afterschool) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (4752)
22	((health$ worker$ or health-care worker$ or health$ professional$ or health-care professional$ or health$ personnel or health-care personnel or general-practitioner$

or gp or gps or nurse$1 or health visitor$1 or midwife or midwives or clinician$1 or pharmacist$ or primary care or general practice or family doctor$1 or family practi$ or dermatologist$1 or nutritionist$1) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (167)

23 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed or motivational) adj2 (advice or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$ or interview$)).ti,ab. (909)

24 ((community or consumer or pressure) adj (group$1 or organi?ation$1)).ti,ab. (678)

25 (coach$ or mentor$ or counsel$ or champion$ or self-study or self-guided).ti,ab. (1962)

26 ((opinion or education$ or influential) adj1 leader$).ti,ab. (132)

27 ((group or peer) adj2 (educat$ or support$)).ti,ab. (237)

28 (pictogram$ or picto-gram$ or pictograph$ or picto-graph$ or infogram$ or info-gram$ or infographic$ or info-graphic$).ti,ab. (7)

29 ((graphic$ or visual$ or pictorial or illustra$ or print$) adj3 (image$1 or stimuli or display$ or dissemin$ or present or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti,ab. (1203)

30 ((data or statistic$ or graph or graphs or numeric$ or verbal or textual or written) adj3 (stimuli or display$1 or dissemin$ or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti,ab. (3936)

31 ((story or stories or narrative$1 or testimon$ or first person) not narrative review$1).ti,ab. (5179)

32 (mass media$ or new media$ or national media$ or local media$ or regional media$ or social media$ or social network$ or marketing or marketed or television$1 or tele-vision$1 or tv or advert$ or billboard$1 or bill-board$1 or poster$1 or cinema$ or video$1 or newspaper$1 or news or magazine$1 or journalis$ or comic$1 or cartoon$1 or leaflet$1 or pamphlet$1 or booklet$1 or workbook$1 or work-book$1 or handbook$1 or hand-book$1 or radio or radios or internet or multimedia or multi-media or web or website$ or interactive or inter-active or facebook or twitter or youtube or you-tube or mail$ out$1 or mailout$1 or mail-shot$1 or mailshot$1 or flyer$1).ti,ab. (34933)

33 (phone$1 or telephone$1 or smartphone$1 or email$1 or e mail or electronic mail$1 or text messag$ or texting or sms or short messag$ or app or apps or android$ or blackberr$ or iphone$1 or ipad$1 or ehealth or e health or mhealth or m health or telehealth$ or tele-health$).ti,ab. (2815)

34 (media$1 adj3 (coverage or report$ or article$ or content$ or present$ or discuss$ or messag$ or campaign$)).ti,ab. (638)

35 (appearance adj3 (based or focused or orientated)).ti,ab. (20)

36 ((uv or ultra-violet or ultraviolet) adj4 (photo$1 or photograph$ or image$1 or imaging)).ti,ab. (0)

37 ((lifestyle$ or behavior$ or behaviour$) adj3 (change$ or changing or modification$ or modify$ or modifies)).ti,ab. (2192)

38 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab. (0)

39 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab. (2)

40 or/1-8 (324)

41 or/9-37 (68756)
42 40 and 41 (34)
43 38 or 39 (2)
44 42 or 43 (36)
45 limit 44 to yr="1994 -Current" (33)

Database name	**HMIC**
Database host	Ovid SP
Database coverage dates	1979 – January 2014
Searcher	Hannah Wood
Search date	28/02/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	223
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	210 (13 direct to Duplicate library)
Reference numbers of records in EndNote library	11413-11616, 15525-15530*
Number of records after de-duplication in EndNote library	109

* These records were originally imported merged with other records, due to import filter error, and were restored.

Database: HMIC Health Management Information Consortium <1979 to January 2014>
Search Strategy:

1 sun/ or sunlight/ (87)
2 ultraviolet radiation/ or ultraviolet radiation effects on humans/ or ultraviolet radiation hazards/ (94)
3 sunburn/ or sunlight hazards/ (48)
4 sunscreens/ (12)
5 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab. (147)
6 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab. (116)
7 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab. (52)
8 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab. (82)
9 exp Vitamin D Deficiency/ (60)
10 melanoma/ (138)
11 Skin cancer/ (238)
12 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti,ab. (225)
13 (osteomalacia or rickets or hypovitaminosis D).ti,ab. (38)
14 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti,ab. (285)
15 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti,ab. (331)
16 or/1-15 (956)
17 exp health promotion/ (10414)
18 consumer health information/ or consumer information/ or health literacy/ or patient education/ or patient information/ or patient knowledge/ (4255)

19 exp mass media/ (730)
20 mass media exposure/ or media coverage/ (254)
21 exp teaching materials/ (363)
22 exp product promotion/ (776)
23 social marketing/ or strategic marketing/ (113)
24 social networks/ (296)
25 communication/ or exp interpersonal communication/ or exp mass communication/ or medical communication/ or patient communication/ or persuasion/ or verbal communication/ or written communication/ (5722)
26 exp "dissemination of information"/ (835)
27 counselling/ or educational counselling/ or group counselling/ or nurse counselling/ or patient counselling/ or advocacy/ or mentoring/ (2128)
28 ((risk$ or probabilit$ or uncertain$ or message$1 or communicat$ or marketing or advice or advise$ or advising or appeal$1 or loss or gain or positive$ or negative$) adj3 (frame or framed or framing)).ti,ab. (33)
29 ((risk$ or probabilit$ or uncertain$) adj3 (notif$ or inform$ or message$1 or communicat$ or marketing or campaign$ or publiciz$ or publicis$ or publicity or advice or advise$ or advising or perceive$ or perception$)).ti,ab. (1020)
30 ((tailor$ or personal$ or individual$ or targeted or targeting) adj3 (message$1 or material$1 or communica$ or feedback or feed back or promot$ or market$ or campaign$)).ti,ab. (641)
31 ((cognitive or cognition or associative or affective or positiv$ or negativ$) adj3 message$1).ti,ab. (29)
32 (decision aid$1 or decision tool$1 or decision support$).ti,ab. (649)
33 ((shared or informed) adj3 (decision$1 or choice$1)).ti,ab. (1086)
34 ((health$ or health care or lifestyle$ or life style$1 or consumer$1) adj2 (information or message$1 or communicat$)).ti,ab. (3291)
35 (education$ adj2 (program$ or intervention$1 or meeting$1 or session$1 or strateg$ or workshop$1 or visit$ or material$1)).ti,ab. (2420)
36 (behavio?r$ adj2 intervention$).ti,ab. (273)
37 (outreach or out reach).ti,ab. (859)
38 ((family or families or parent$ or care-giver$ or caregiver$ or carer or carers or guardian$ or wife or wives or husband or husbands or spouse$1 or spousal or partner or partners or mother$ or father$ or teacher$1) adj3 (led or educat$ or train$ or teach or teaches or teaching or taught or involv$ or intervention$ or program$ or session$1)).ti,ab. (3164)
39 (work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community intervention$ or community program$ or community scheme$ or faith-based or faith-led or church-based or church-led).ti,ab. (3016)
40 ((work or workplace$ or work place$ or employer$ or school$ or playschool$ or preschool$ or nursery or nurseries or kindergarten$ or creche$ or highschool$ or afterschool) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (4040)
41 ((health$ worker$ or health-care worker$ or health$ professional$ or health-care professional$ or health$ personnel or health-care personnel or general-practitioner$ or gp or gps or nurse$1 or health visitor$1 or midwife or midwives or clinician$1 or pharmacist$ or primary care or general practice or family doctor$1 or family practi$ or dermatologist$1 or nutritionist$1) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (9707)
42 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed or motivational) adj2 (advice or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$ or interview$)).ti,ab. (1217)
43 ((community or consumer or pressure) adj (group$1 or organi?ation$1)).ti,ab. (667)

44 (coach$ or mentor$ or counsel$ or champion$ or self-study or self-guided).ti,ab. (4355)
45 ((opinion or education$ or influential) adj1 leader$).ti,ab. (113)
46 ((group or peer) adj2 (educat$ or support$)).ti,ab. (818)
47 (pictogram$ or picto-gram$ or pictograph$ or picto-graph$ or infogram$ or info-gram$ or infographic$ or info-graphic$).ti,ab. (17)
48 ((graphic$ or visual$ or pictorial or illustra$ or print$) adj3 (image$1 or stimuli or display$ or dissemin$ or present or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti,ab. (677)
49 ((data or statistic$ or graph or graphs or numeric$ or verbal or textual or written) adj3 (stimuli or display$1 or dissemin$ or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti,ab. (2549)
50 ((story or stories or narrative$1 or testimon$ or first person) not narrative review$1).ti,ab. (1994)
51 (mass media$ or new media$ or national media$ or local media$ or regional media$ or social media$ or social network$ or marketing or marketed or television$1 or tele-vision$1 or tv or advert$ or billboard$1 or bill-board$1 or poster$1 or cinema$ or video$1 or newspaper$1 or news or magazine$1 or journalis$ or comic$1 or cartoon$1 or leaflet$1 or pamphlet$1 or booklet$1 or workbook$1 or work-book$1 or handbook$1 or hand-book$1 or radio or radios or internet or multimedia or multi-media or web or website$ or interactive or inter-active or facebook or twitter or youtube or you-tube or mail$ out$1 or mailout$1 or mail-shot$1 or mailshot$1 or flyer$1).ti,ab. (15929)
52 (phone$1 or telephone$1 or smartphone$1 or email$1 or e mail or electronic mail$1 or text messag$ or texting or sms or short messag$ or app or apps or android$ or blackberr$ or iphone$1 or ipad$1 or ehealth or e health or mhealth or m health or telehealth$ or tele-health$).ti,ab. (4499)
53 (media$1 adj3 (coverage or report$ or article$ or content$ or present$ or discuss$ or messag$ or campaign$)).ti,ab. (592)
54 (appearance adj3 (based or focused or orientated)).ti,ab. (9)
55 ((uv or ultra-violet or ultraviolet) adj4 (photo$1 or photograph$ or image$1 or imaging)).ti,ab. (0)
56 ((lifestyle$ or behavior$ or behaviour$) adj3 (change$ or changing or modification$ or modify$ or modifies)).ti,ab. (1974)
57 exp attitudes/ (18311)
58 health beliefs/ (192)
59 awareness/ or public awareness/ (403)
60 social perception/ (83)
61 behaviour modification/ (202)
62 professional role/ (2892)
63 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab. (6)
64 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab. (45)
65 or/17-62 (82714)
66 16 and 65 (238)
67 66 or (63 or 64) (256)
68 limit 67 to yr="1994 -Current" (223)

Database name	PsycINFO
Database host	Ovid SP
Database coverage dates for final search	1806- March Week 3 2014
Searcher	Hannah Wood
Search date	Search 1st run 15/03/14, on realizing that total number of records not exported correctly search repeated 20/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	1004 (search 20/03/14), 998 of these identified during search 1 (15/03/14), the remainder new records added to database since 15/03/14
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	Search 1 398 (223 direct to Duplicate library) – on realizing total number not exported and therefore loaded to EndNote, search re-run. Search 2 268 (736 direct to duplicate Library)
Reference numbers of records in EndNote library	11662-12060, 16537-16805
Number of records after de-duplication in EndNote library	489

Database: PsycINFO <1806 to March Week 3 2014>
Search Strategy:

1 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab. (627)
2 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab. (436)
3 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab. (436)
4 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab. (620)
5 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti,ab. (935)
6 (osteomalacia or rickets or hypovitaminosis D).ti,ab. (143)
7 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti,ab. (507)
8 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti,ab. (666)
9 or/1-8 (3296)
10 health behavior/ (16070)
11 communication/ or exp communications media/ or communication barriers/ or exp interpersonal communication/ or persuasive communication/ or exp verbal communication/ or information dissemination/ or knowledge transfer/ or messages/ (183253)
12 health education/ or client education/ or health knowledge/ or health literacy/ (17360)
13 advertising/ or exp marketing/ or public relations/ or health promotion/ or public service announcements/ (36153)
14 exp teaching/ (87494)
15 Framing Effects/ (589)
16 exp counseling/ (65180)

17 health communication.jn. (945)
18 journal of health communication.jn. (944)
19 ((risk$ or probabilit$ or uncertain$ or message$1 or communicat$ or marketing or advice or advise$ or advising or appeal$1 or loss or gain or positive$ or negative$) adj3 (frame or framed or framing)).ti,ab. (1358)
20 ((risk$ or probabilit$ or uncertain$) adj3 (notif$ or inform$ or message$1 or communicat$ or marketing or campaign$ or publiciz$ or publicis$ or publicity or advice or advise$ or advising or perceive$ or perception$)).ti,ab. (12555)
21 ((tailor$ or personal$ or individual$ or targeted or targeting) adj3 (message$1 or material$1 or communica$ or feedback or feed back or promot$ or market$ or campaign$)).ti,ab. (9967)
22 ((cognitive or cognition or associative or affective or positiv$ or negativ$) adj3 message$1).ti,ab. (1052)
23 (decision aid$1 or decision tool$1 or decision support$).ti,ab. (2780)
24 ((shared or informed) adj3 (decision$1 or choice$1)).ti,ab. (4102)
25 ((health$ or health care or lifestyle$ or life style$1 or consumer$1) adj2 (information or message$1 or communicat$)).ti,ab. (8771)
26 (education$ adj2 (program$ or intervention$1 or meeting$1 or session$1 or strateg$ or workshop$1 or visit$ or material$1)).ti,ab. (31278)
27 (behavio?r$ adj2 intervention$).ti,ab. (9576)
28 (outreach or out reach).ti,ab. (4826)
29 ((family or families or parent$ or care-giver$ or caregiver$ or carer or carers or guardian$ or wife or wives or husband or husbands or spouse$1 or spousal or partner or partners or mother$ or father$ or teacher$1) adj3 (led or educat$ or train$ or teach or teaches or teaching or taught or involv$ or intervention$ or program$ or session$1)).ti,ab. (86229)
30 (work-based or workplace-based or worksite-based or community-led or community-based or community-wide or community-centred or community-centered or community-run or community intervention$ or community program$ or community scheme$ or faith-based or faith-led or church-based or church-led).ti,ab. (22650)
31 ((work or workplace$ or work place$ or employer$ or school$ or playschool$ or preschool$ or nursery or nurseries or kindergarten$ or creche$ or highschool$ or afterschool) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (77418)
32 ((health$ worker$ or health-care worker$ or health$ professional$ or health-care professional$ or health$ personnel or health-care personnel or general-practitioner$ or gp or gps or nurse$1 or health visitor$1 or midwife or midwives or clinician$1 or pharmacist$ or primary care or general practice or family doctor$1 or family practi$ or dermatologist$1 or nutritionist$1) adj3 (led or educat$ or train$ or teach$ or involv$ or intervention$ or program$ or session$1)).ti,ab. (17142)
33 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed or motivational) adj2 (advice or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$ or interview$)).ti,ab. (18198)
34 ((community or consumer or pressure) adj (group$1 or organi?ation$1)).ti,ab. (2878)
35 (coach$ or mentor$ or counsel$ or champion$ or self-study or self-guided).ti,ab. (103571)
36 ((opinion or education$ or influential) adj1 leader$).ti,ab. (2513)
37 ((group or peer) adj2 (educat$ or support$)).ti,ab. (10357)
38 (pictogram$ or picto-gram$ or pictograph$ or picto-graph$ or infogram$ or info-gram$ or infographic$ or info-graphic$).ti,ab. (319)
39 ((graphic$ or visual$ or pictorial or illustra$ or print$) adj3 (image$1 or stimuli or display$ or dissemin$ or present or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (5919)

40 ((data or statistic$ or graph or graphs or numeric$ or verbal or textual or written) adj3 (stimuli or display$1 or dissemin$ or presented or presentation$1 or communicat$ or message$1 or advice or feedback or feed back or inform or information or aid or aids or representation$1 or material$1)).ti. (2832)

41 ((story or stories or narrative$1 or testimon$ or first person) not narrative review$1).ti,ab. (79746)

42 (mass media$ or new media$ or national media$ or local media$ or regional media$ or social media$ or social network$ or marketing or marketed or television$1 or tele-vision$1 or tv or advert$ or billboard$1 or bill-board$1 or poster$1 or cinema$ or video$1 or newspaper$1 or news or magazine$1 or journalis$ or comic$1 or cartoon$1 or leaflet$1 or pamphlet$1 or booklet$1 or workbook$1 or work-book$1 or handbook$1 or hand-book$1 or radio or radios or internet or multimedia or multi-media or web or website$ or interactive or inter-active or facebook or twitter or youtube or you-tube or mail$ out$1 or mailout$1 or mail-shot$1 or mailshot$1 or flyer$1).ti,ab. (171554)

43 (phone$1 or telephone$1 or smartphone$1 or email$1 or e mail or electronic mail$1 or text messag$ or texting or sms or short messag$ or app or apps or android$ or blackberr$ or iphone$1 or ipad$1 or ehealth or e health or mhealth or m health or telehealth$ or tele-health$).ti,ab. (32165)

44 (media$1 adj3 (coverage or report$ or article$ or content$ or present$ or discuss$ or messag$ or campaign$)).ti,ab. (6392)

45 (appearance adj3 (based or focused or orientated)).ti,ab. (344)

46 ((uv or ultra-violet or ultraviolet) adj4 (photo$1 or photograph$ or image$1 or imaging)).ti,ab. (22)

47 ((lifestyle$ or behavior$ or behaviour$) adj3 (change$ or changing or modification$ or modify$ or modifies)).ti,ab. (40598)

48 exp attitudes/ (263379)

49 attitude change/ or attitude formation/ or irrational beliefs/ or stigma/ or world view/ (17638)

50 motivation/ or intention/ (45663)

51 exp social perception/ (41840)

52 social desirability/ or social influences/ (13687)

53 risk perception/ or exp risk taking/ (23313)

54 exp health personnel/ (100579)

55 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab. (24)

56 or/10-54 (1125752)

57 9 and 56 (1042)

58 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab. (355)

59 57 or 58 or 55 (1084)

60 limit 59 to (english language and yr="1994 -Current") (1004)

Database name	Social Policy & Practice
Database host	Ovid SP
Database coverage dates	1890- January 2014
Searcher	Hannah Wood
Search date	06/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	173
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	167 (6 direct to Duplicate library)
Reference numbers of records in EndNote library	12062-12228
Number of records after de-duplication in EndNote library	137

Database: Social Policy and Practice <201401>
Search Strategy:

1 ((sun or suns or sunning or sunshine or sunlight$) adj3 (damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1 or underexpose$1 or underexposure$1)).ti,ab,de. (43)

2 ((uv or uva or uvb or uvc or ultra-violet or ultraviolet or solar) adj3 (ray$1 or radiation or irradiat$ or damag$ or protect$ or safe or safety or risk$ or benefit$1 or beneficial or index or indexes or exposure$1 or overexposure$1 or expose$1 or overexpose$1)).ti,ab,de. (19)

3 (sunscreen$ or sun-screen$ or sunblock$ or sun-block$ or spf or sunburn$ or sun-burn$ or photo-damag$ or photodamag$ or photoag$ or photo-ag$ or photo-expos$ or photoexpos$).ti,ab,de. (14)

4 (sunbath$ or sun-bath$ or suntan$ or tan or tans or tanning or tanned or sunbed$1 or sun-bed$ or sunlamp$1 or sun-lamp$ or solarium$1 or solaria$).ti,ab,de. (40)

5 (vitaminD$1 or vitamin D or cholecalciferol$ or colecalciferol$ or ergocalciferol$ or calciferol$ or alfacalcidol$).ti,ab,de. (67)

6 (osteomalacia or rickets or hypovitaminosis D).ti,ab,de. (23)

7 ((skin or skins) adj3 (cancer$ or neoplasm$ or tumor$ or tumour$ or carcinoma$ or malignan$)).ti,ab,de. (39)

8 (melanoma$ or basal cell carcinoma$ or squamous cell carcinoma$).ti,ab,de. (15)

9 or/1-8 (191)

10 (skinsafe$ or sunsafe$ or sunsmart$ or sunwise$ or pool cool or kidskin or kid skin or slipslopslap or slip slop slap or shunburn or shun burn).ti,ab,de. (3)

11 ((sun or suns or sunning or sunshine or sunlight$ or sunbath$ or suntan$ or sunbed$1 or sunlamp$1 or sunscreen$ or sunblock$ or solarium$1 or solaria$ or uv or uva or uvb or uvc or ultraviolet or ultra-violet or tan or tans or tanning or tanned or spf) adj5 (risk$ or benefit$ or protect$ or exposure$ or safe$) adj5 (knowledg$ or attitude$ or behavio$ or value$ or understand$ or belief$ or believe or perception$ or perceive$ or view or views or prefer$ or intention$ or habit$1 or practice$ or comply or complies or compliance or adhere$1 or adherence or concordance or accordance or accept$ or motivation$1 or awareness$ or uptake or up-take or takeup or take-up or barrier$1 or facilitator$1 or utilis$ or utiliz$)).ti,ab,de. (10)

12 9 or 10 or 11 (192)

13 limit 12 to yr="1994 -Current" (173)

Database name	Social Sciences Citation Index (SSCI)
Database host	Web of Knowledge (Thomson Reuters)
Database coverage dates	1956 – 28/02/2014
Searcher	Hannah Wood
Search date	06/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	1543
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	784 (759 direct to Duplicate library)
Reference numbers of records in EndNote library	12231-13014
Number of records after de-duplication in EndNote library	598

# 43	1,543	#42 OR #41 OR #40
# 42	625	TS=(("sun" OR "suns" OR "sunning" OR "sunshine" OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR "uv" OR "uva" OR "uvb" OR "uvc" OR "ultraviolet" OR "ultra-violet" OR "tan" OR "tans" OR "tanning" OR "tanned" OR "spf") NEAR/5 (risk* OR benefit* OR protect* OR exposure* OR safe*) NEAR/5 (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR believe OR perception* OR perceive* OR view OR views OR prefer* OR intention* OR habit* OR practice* OR "comply" OR "complies" OR "compliance" OR adhere* OR "adherence" OR "concordance" OR "accordance" OR accept* OR motivation* OR awareness* OR "uptake" OR "up-take" OR "takeup" OR "take-up" OR barrier* OR facilitator* OR utilis* OR utiliz*))
# 41	64	TS=(skinsafe* OR sunsafe* OR sunsmart* OR sunwise* OR "pool cool" OR "kidskin" OR "kid skin" OR "slipslopslap" OR "slip slop slap" OR "shunburn" OR "shun burn")
# 40	1,306	#39 AND #9
# 39	573,871	#38 OR #37 OR #36 OR #35 OR #34 OR #33 OR #32 OR #31 OR #30 OR #29 OR #28 OR #27 OR #26 OR #25 OR #24 OR #23 OR #22 OR #21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10
# 38	23,804	TS=((lifestyle* OR behavior* OR behaviour*) NEAR/3 (change* OR "changing" OR modification* OR modify* OR "modifies"))
# 37	60	TS=(("uv" OR "ultra-violet" OR "ultraviolet") NEAR/4 (photo* OR photograph* OR image* OR "imaging"))
# 36	294	TS=("appearance" NEAR/3 ("based" OR "focused" OR "orientated"))
# 35	10,286	TS=(media* NEAR/3 ("coverage" OR report* OR article* OR content* OR present* OR discuss* OR messag* OR campaign*))
# 34	40,161	TS=(phone* OR telephone* OR smartphone* OR email* OR "e mail" OR "electronic mail*" OR "text messag*" OR "texting" OR "sms" OR "short messag*" OR "app" OR "apps" OR android* OR blackberr* OR iphone* OR ipad* OR "ehealth" OR "e health" OR "mhealth" OR "m health" OR telehealth* OR "tele-health*")
# 33	209,064	TS=("mass media*" OR "new media*" OR "national media*" OR "local media*" OR "regional media*" OR "social media*" OR "social network*" OR "marketing" OR "marketed" OR television* OR "tele-vision*" OR "tv" OR advert* OR billboard* OR "bill-board*" OR poster* OR cinema* OR video* OR newspaper* OR "news" OR magazine* OR journalis* OR comic* OR cartoon* OR leaflet* OR pamphlet* OR booklet* OR wORkbook* OR wORk-book* OR handbook* OR hand-book* OR "radio" OR "radios" OR "internet" OR "multimedia" OR "multi-media" OR "web" OR website* OR "interactive" OR "inter-active" OR "facebook" OR "twitter"

OR "youtube" OR "you-tube" OR "mail* out*" OR mailout* OR "mail-shot*" OR mailshot* OR flyer*)

# 32	59,193	TS=(("story" OR "stories" OR narrative* OR testimon* OR "first person") NOT ("narrative review*"))
# 31	27,941	TS=(("data" OR statistic* OR "graph" OR "graphs" OR numeric* OR "verbal" OR "textual" OR "written") NEAR/3 ("stimuli" OR display* OR dissemin* OR "presented" OR presentation* OR communicat* OR message* OR "advice" OR "feedback" OR "feed back" OR "inform" OR "information" OR aid OR aids OR representation* OR material*))
# 30	27,843	TS=((graphic* OR visual* OR "pictorial" OR illustra* OR print*) NEAR/3 (image* OR "stimuli" OR display* OR dissemin* OR "present" OR "presented" OR presentation* OR communicat* OR message* OR "advice" OR "feedback" OR "feed back" OR "inform" OR "information" OR "aid" OR "aids" OR representation* OR material*))
# 29	276	TS=(pictogram* OR picto-gram* OR pictograph* OR picto-graph* OR infogram* OR info-gram* OR infographic* OR info-graphic*)
# 28	8,643	TS=(("group" OR "peer") NEAR/2 (educat* OR "support"))
# 27	1,617	TS=(("opinion" OR education* OR "influential") NEAR/1 leader*)
# 26	41,941	TS=(coach* OR mentor* OR counsel* OR champion* OR “self-study” OR “self-guided”)
# 25	5,986	TS=(("community" OR "consumer" OR "pressure") NEAR/1 (group* OR organi?ation*))
# 24	15,410	TS=(("brief" OR opportunist* OR "concise" OR "short" OR "direct" OR "lifestyle" OR "written" OR "oral" OR "verbal" OR "personali?ed" OR "individuali?ed" OR "motivational") NEAR/2 ("advice" OR negotiation* OR "guidance" OR discussion* OR "encouragement" OR intervention* OR program* OR meeting* OR session* OR interview*))
# 23	22,790	TS=(("health* worker*" OR "health-care worker*" OR "health* professional*" OR "heath-care professional*" OR "health* personnel" OR "health-care personnel" OR "general-practitioner*" OR "gp" OR "gps" OR nurse* OR "health visitor*" OR "midwife" OR "midwives" OR clinician* OR pharmacist* OR "primary care" OR "general practice" OR "family doctor*" OR "family practi*" OR dermatologist* OR nutritionist*) NEAR/3 ("led" OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
# 22	52,952	TS=(("work" OR workplace* OR "work place*" OR employer* OR school* OR playschool* OR preschool* OR "nursery" OR "nurseries" OR kindergarten* OR creche* OR highschool* OR "afterschool") NEAR/3 ("led" OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
# 21	22,811	TS=("work-based" OR "workplace-based" OR "worksite-based" OR "community-led" OR "community-based" OR "community-wide" OR "community-centred" OR "community-centered" OR "community-run" OR "community intervention*" OR "community program*" OR "community scheme*" OR "faith-based" OR "faith-led" OR "church-based" OR "church-led")
# 20	58,054	TS=(("family" OR "families" OR parent* OR care-giver* OR caregiver* OR "carer" OR "carers" OR guardian* OR "wife" OR "wives" OR "husband" OR "husbands" OR spouse* OR "spousal" OR "partner "OR "partners" OR mother* OR father* OR teacher*) NEAR/3 ("led" OR educat* OR train* OR "teach" OR "teaches" OR "teaching" OR "taught" OR involv* OR intervention* OR program* OR session*))
# 19	4,970	TS=(outreach OR "out reach")
# 18	10,608	TS=(behavio* NEAR/2 intervention*)
# 17	26,899	TS=(education* NEAR/2 (program* OR intervention* OR meeting* OR session* OR strateg* OR workshop* OR visit* OR material*))
# 16	18,240	TS=((health* OR "health care" OR lifestyle* OR "life style*" OR consumer*) NEAR/2 ("information" OR message* OR communicat*))
# 15	5,565	TS=(("shared" OR "informed") NEAR/3 (decision* OR choice*))
# 14	7,785	TS=("decision aid*" OR "decision tool*" OR "decision support*")

13 787 TS=(("cognitive" OR "cognition" OR "associative" OR "affective" OR positiv* OR negativ*) NEAR/3 message*)
12 11,037 TS=((tailor* OR personal* OR individual* OR "targeted" OR "targeting") NEAR/3 (message* OR material* OR communica* OR "feedback" OR "feed back" OR promot* OR market* OR campaign*))
11 22,511 TS=((risk* OR probabilit* OR uncertain*) NEAR/3 (notif* OR inform* OR message* OR communicat* OR "marketing" OR campaign* OR publiciz* OR publicis* OR "publicity" OR "advice" OR advise* OR "advising" OR perceive* OR perception*))
10 1,521 TS=((risk* OR probabilit* OR uncertain* OR message* OR communicat* OR "marketing" OR "advice" OR advise* OR "advising" OR appeal* OR "loss" OR "gain" OR positive* OR negative*) NEAR/3 ("frame" OR "framed" OR "framing"))
9 5,059 #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
8 1,649 TS=(melanoma* OR "basal cell carcinoma*" OR "squamous cell carcinoma*")
7 1,185 TS=(("skin" OR "skins") NEAR/3 (cancer* OR neoplasm* OR tumor* OR tumour* OR carcinoma* OR malignan*))
6 183 TS=("osteomalacia" OR "rickets" OR "hypovitaminosis D")
5 1,506 TS=(vitaminD* OR "vitamin D" OR cholecalciferol* OR colecalciferol* OR ergocalciferol* OR calciferol* OR alfacalcidol*)
4 757 TS=(sunbath* OR sun-bath* OR suntan* OR "tan" OR "tans" OR "tanning" OR "tanned" OR sunbed* OR sun-bed* OR sunlamp* OR sun-lamp* OR solarium* OR solaria*)
3 741 TS=(sunscreen* OR sun-screen* OR sunblock* OR sun-block* OR "spf" OR sunburn* OR sun-burn* OR photo-damag* OR photodamag* OR photoag* OR photo-ag* OR photo-expos* OR photoexpos*)
2 825 TS=(("uv" OR "uva" OR "uvb" OR "uvc" OR "ultra-violet" OR "ultraviolet" OR "solar") NEAR/3 (ray* OR "radiation" OR irradiat* OR damag* OR protect* OR "safe" OR "safety" OR risk* OR benefit* OR "beneficial" OR "index" OR "indexes" OR exposure* OR overexposure* OR expose* OR overexpose*))
1 1,033 TS=(("sun" OR "suns" OR "sunning" OR "sunshine" OR sunlight*) NEAR/3 (damag* OR protect* OR "safe" OR "safety" OR risk* OR benefit* OR "beneficial" OR "index" OR "indexes" OR exposure* OR overexposure* OR expose* OR overexpose* OR underexpose* OR underexposure*))

Indexes=SSCI Timespan=1994-2014

Database name	**CINAHL Plus**
Database host	EBSCO Host
Database coverage dates	1937-2014
Searcher	Hannah Wood
Search date	13/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	3014
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	1983 (1031 direct to Duplicate library)
Reference numbers of records in EndNote library	13056-15038
Number of records after de-duplication in EndNote library	1618

S74 S72 AND S73
3,014
S73 PY 199401-
3,653,611
S72 S63 OR S71
3,093
S71 S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70
465
S70 AB((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (uptake OR “up-take” OR takeup OR “take-up” OR barrier* OR facilitator* OR utilis* OR utiliz*))
23
S69 TI((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (uptake OR “up-take” OR takeup OR “take-up” OR barrier* OR facilitator* OR utilis* OR utiliz*))
3
S68 AB((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (comply OR complies OR compliance OR adhere* OR adherence OR concordance OR accordance OR accept* OR motivation* OR awareness*))
43
S67 TI((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (comply OR complies OR compliance OR adhere* OR adherence OR concordance OR accordance OR accept* OR motivation* OR awareness*))
11
S66 AB((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR believe OR perception* OR perceive* OR view OR views OR prefer* OR intention* OR habit* OR practice*))
335
S65 TI((sun OR suns OR sunning OR sunshine OR sunlight* OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR “ultra-violet” OR tan OR tans OR tanning OR tanned OR spf) N5 (risk* OR benefit* OR protect* OR exposure* OR safe*) N5 (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR believe OR perception* OR perceive* OR view OR views OR prefer* OR intention* OR habit* OR practice*))
171
S64 TI(skinsafe* OR sunsafe* OR sunsmart* OR sunwise* OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn”) OR AB(skinsafe* OR sunsafe* OR sunsmart* OR sunwise* OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn”)
46

S63 S13 AND S62
2,997
S62 S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61

907,994
S61 (MH "Professional-Patient Relations+")
60,591
S60 (MH "Behavioral Changes") OR (MH "Health Behavior") OR (MH "Patient Compliance+") OR (MH "Risk Taking Behavior")
70,006
S59 (MH "Attitude") OR (MH "Attitude to Change") OR (MH "Attitude of Health Personnel+") OR (MH "Attitude to Health+") OR (MH "Attitude to Risk") OR (MH "Consumer Attitudes") OR (MH "Patient Attitudes") OR (MH "Social Attitudes")
178,631
S58 (MM "Knowledge")
2,619
S57 TI((lifestyle* OR behavior* OR behaviour*) N3 (change* OR changing OR modification* OR modify* OR modifies)) OR AB((lifestyle* OR behavior* OR behaviour*) N3 (change* OR changing OR modification* OR modify* OR modifies))

14,485
S56 TI((uv OR “ultra-violet” OR ultraviolet) N4 (photo* OR photograph* OR image* OR imaging)) OR AB((uv OR “ultra-violet” OR ultraviolet) N4 (photo* OR photograph* OR image* OR imaging))
143
S55 TI(appearance N3 (based OR focused OR orientated)) OR AB(appearance N3 (based OR focused OR orientated))
161
S54 TI(media* N3 (coverage OR report* OR article* OR content* OR present* OR discuss* OR messag* OR campaign*)) OR AB(media* N3 (coverage OR report* OR article* OR content* OR present* OR discuss* OR messag* OR campaign*))

3,951
S53 AB(phone* OR telephone* OR smartphone* OR email* OR “e mail” OR “electronic mail*” OR “text messag*” OR texting OR sms OR “short messag*” OR app OR apps OR android* OR blackberr* OR iphone* OR ipad* OR ehealth OR “e health” OR mhealth OR “m health” OR telehealth* OR “tele-health*”)
21,642
S52 TI(phone* OR telephone* OR smartphone* OR email* OR “e mail” OR “electronic mail*” OR “text messag*” OR texting OR sms OR “short messag*” OR app OR apps OR android* OR blackberr* OR iphone* OR ipad* OR ehealth OR “e health” OR mhealth OR “m health” OR telehealth* OR “tele-health*”)
10,446
S51 TI(web OR website* OR interactive OR “inter-active” OR facebook OR twitter OR youtube OR “you-tube” OR “mail* out*” OR mailout* OR “mail-shot*” OR mailshot* OR flyer*) OR AB(web OR website* OR interactive OR “inter-active” OR facebook OR twitter OR youtube OR “you-tube” OR “mail* out*” OR mailout* OR “mail-shot*” OR mailshot* OR flyer*)
38,238
S50 AB(“mass media*” OR “new media*” OR "national media*” OR “local media*” OR “regional media*” OR “social media*” OR “social network*” OR marketing OR marketed OR television* OR “tele-vision*” OR tv OR advert* OR billboard* OR “bill-board*” OR poster* OR cinema* OR video* OR newspaper* OR news OR

	magazine* OR journalis* OR comic* OR cartoon* OR leaflet* OR pamphlet* OR booklet* OR workbook* OR “work-book*” OR handbook* OR “hand-book*” OR radio OR radios OR internet OR multimedia OR “multi-media”)
	55,023
S49	TI(“mass media*” OR “new media*” OR “national media*” OR “local media*” OR “regional media*” OR “social media*” OR “social network*” OR marketing OR marketed OR television* OR “tele-vision*” OR tv OR advert* OR billboard* OR “bill-board*” OR poster* OR cinema* OR video* OR newspaper* OR news OR magazine* OR journalis* OR comic* OR cartoon* OR leaflet* OR pamphlet* OR booklet* OR workbook* OR “work-book*” OR handbook* OR “hand-book*” OR radio OR radios OR internet OR multimedia OR “multi-media”)
	79,055
S48	TI((story OR stories OR narrative* OR testimon* OR “first person”) NOT “narrative review*”) OR AB((story OR stories OR narrative* OR testimon* OR “first person”) NOT “narrative review*”)
	23,402
S47	TI((data OR statistic* OR graph OR graphs OR numeric* OR verbal OR textual OR written) N3 (stimuli OR display* OR dissemin* OR presented OR presentation* OR communicat* OR message* OR advice OR feedback OR “feed back” OR inform OR information OR aid OR aids OR representation* OR material*))
	1,361
S46	TI((graphic* OR visual* OR pictorial OR illustra* OR print*) N3 (image* OR stimuli OR display* OR dissemin* OR present OR presented OR presentation* OR communicat* OR message* OR advice OR feedback OR “feed back” OR inform OR information OR aid OR aids OR representation* OR material*))
	1,211
S45	TI(pictogram* OR “picto-gram*” OR pictograph* OR “picto-graph*” OR infogram* OR “info-gram*” OR infographic* OR “info-graphic*”) OR AB(pictogram* OR “picto-gram*” OR pictograph* OR “picto-graph*” OR infogram* OR “info-gram*” OR infographic* OR “info-graphic*”)
	95
S44	TI((group OR peer) N2 (educat* OR support*)) OR AB((group OR peer) N2 (educat* OR support*))
	7,104
S43	TI((opinion OR education* OR influential) N1 leader*) OR AB((opinion OR education* OR influential) N1 leader*)
	791
S42	TI(coach* OR mentor* OR counsel* OR champion* OR “self-study” OR “self-guided”) OR AB(coach* OR mentor* OR counsel* OR champion* OR “self-study” OR “self-guided”)
	38,568
S41	TI((community OR consumer OR pressure) N1 (group* OR organi?ation*)) OR AB((community OR consumer OR pressure) N1 (group* OR organi?ation*))
	3,376
S40	AB((brief OR opportunist* OR concise OR short OR direct OR lifestyle OR written OR oral OR verbal OR personali?ed OR individuali?ed OR motivational) N2 (advice OR negotiation* OR guidance OR discussion* OR encouragement OR intervention* OR program* OR meeting* OR session* OR interview*))
	9,446
S39	TI((brief OR opportunist* OR concise OR short OR direct OR lifestyle OR written OR oral OR verbal OR personali?ed OR individuali?ed OR motivational) N2 (advice OR negotiation* OR guidance OR discussion* OR encouragement OR intervention* OR program* OR meeting* OR session* OR interview*))
	3,825
S38	AB((“health* worker*” OR “health-care worker*” OR “health* professional*” OR “health-care professional*” OR “health* personnel” OR “health-care personnel” OR “general-practitioner*” OR gp OR gps OR nurse* OR health visitor* OR midwife OR

midwives OR clinician* OR pharmacist* OR “primary care” OR “general practice” OR “family doctor*” OR “family practi*” OR dermatologist* OR nutritionist*) N3 (led OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
34,345

S37 TI((“health* worker*” OR “health-care worker*” OR “health* professional*” OR “health-care professional*” OR “health* personnel” OR “health-care personnel” OR “general-practitioner*” OR gp OR gps OR nurse* OR health visitor* OR midwife OR midwives OR clinician* OR pharmacist* OR “primary care” OR “general practice” OR “family doctor*” OR “family practi*” OR dermatologist* OR nutritionist*) N3 (led OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
16,814

S36 AB((work OR workplace* OR employer* OR school* OR playschool* OR preschool* OR nursery OR nurseries OR kindergarten* OR creche* OR highschool* OR afterschool) N3 (led OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
17,868

S35 TI((work OR workplace* OR employer* OR school* OR playschool* OR preschool* OR nursery OR nurseries OR kindergarten* OR creche* OR highschool* OR afterschool) N3 (led OR educat* OR train* OR teach* OR involv* OR intervention* OR program* OR session*))
7,802

S34 AB(“work-based” OR “workplace-based” OR “worksite-based” OR “community-led” OR “community-based” OR “community-wide” OR “community-centred” OR “community-centered” OR “community-run” OR “community intervention*” OR “community program*” OR “community scheme*” OR “faith-based” OR “faith-led” OR “church-based” OR “church-led”)
13,218

S33 TI(“work-based” OR “workplace-based” OR “worksite-based” OR “community-led” OR “community-based” OR “community-wide” OR “community-centred” OR “community-centered” OR “community-run” OR “community intervention*” OR “community program*” OR “community scheme*” OR “faith-based” OR “faith-led” OR “church-based” OR “church-led”)
6,755

S32 AB((family OR families OR parent* OR “care-giver*” OR caregiver* OR carer OR carers OR guardian* OR wife OR wives OR husband OR husbands OR spouse* OR spousal OR partner OR partners OR mother* OR father* OR teacher*) N3 (led OR educat* OR train* OR teach OR teaches OR teaching OR taught OR involv* OR intervention* OR program* OR session*))
23,961

S31 TI((family OR families OR parent* OR “care-giver*” OR caregiver* OR carer OR carers OR guardian* OR wife OR wives OR husband OR husbands OR spouse* OR spousal OR partner OR partners OR mother* OR father* OR teacher*) N3 (led OR educat* OR train* OR teach OR teaches OR teaching OR taught OR involv* OR intervention* OR program* OR session*))
8,498

S30 TI(outreach OR “out reach”) OR AB(outreach OR “out reach”)
4,291

S29 TI(behavi* N2 intervention*) OR AB(behavi* N2 intervention*)
4,645

S28 TI(education* N2 (program* OR intervention* OR meeting* OR session* OR strateg* OR workshop* OR visit* OR material*)) OR AB(education* N2 (program* OR intervention* OR meeting* OR session* OR strateg* OR workshop* OR visit* OR material*))
28,569

S27 TI((health* OR “health care” OR lifestyle* OR “life style*” OR consumer*) N2 (information OR message* OR communicat*)) OR AB((health* OR “health care” OR lifestyle* OR “life style*” OR consumer*) N2 (information OR message* OR communicat*))
15,716

S26 TI((shared OR informed) N3 (decision* OR choice*)) OR AB((shared OR informed) N3 (decision* OR choice*))
4,414

S25 TI("decision aid*" OR "decision tool*" OR "decision support*") OR AB("decision aid*" OR "decision tool*" OR "decision support*")
3,070

S24 TI((cognitive OR cognition OR associative OR affective OR positiv* OR negativ*) N3 message*) OR AB((cognitive OR cognition OR associative OR affective OR positiv* OR negativ*) N3 message*)
290

S23 TI((tailor* OR personal* OR individual* OR targeted OR targeting) N3 (message* OR material* OR communica* OR feedback OR “feed back” OR promot* OR market* OR campaign*)) OR AB((tailor* OR personal* OR individual* OR targeted OR targeting) N3 (message* OR material* OR communica* OR feedback OR “feed back” OR promot* OR market* OR campaign*))
4,932

S22 TI((risk* OR probabilit* OR uncertain*) N3 (notif* OR inform* OR message* OR communicat* OR marketing OR campaign* OR publiciz* OR publicis* OR publicity OR advice OR advise* OR advising OR perceive* OR perception*)) OR AB((risk* OR probabilit* OR uncertain*) N3 (notif* OR inform* OR message* OR communicat* OR marketing OR campaign* OR publiciz* OR publicis* OR publicity OR advice OR advise* OR advising OR perceive* OR perception*))
8,378

S21 TI((risk* OR probabilit* OR uncertain* OR message* OR communicat* OR marketing OR advice OR advise* OR advising OR appeal* OR loss OR gain OR positive* OR negative*) N3 (frame OR framed OR framing)) OR AB((risk* OR probabilit* OR uncertain* OR message* OR communicat* OR marketing OR advice OR advise* OR advising OR appeal* OR loss OR gain OR positive* OR negative*) N3 (frame OR framed OR framing))
357

S20 JN "health communication" OR "journal of health communication"
1,398

S19 (MH "Counseling") OR (MH "Peer Counseling") OR (MH "Motivational Interviewing")
19,298

S18 (MH "Marketing+")
19,330

S17 (MH "Student Health Education") OR (MH "School Health Education") OR (MH "Patient Education") OR (MH "Health Education") OR (MH "Parenting Education") OR (MH "Health Fairs") OR (MH "Education, Nonprofessional")
68,995

S16 (MH "Health Promotion")
35,236

S15 (MH "Communications Media+")
338,714

S14 (MH "Communication") OR (MH "Communication Barriers") OR (MH "Social Networking")
45,118

S13 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12
22,308

S12 TI(melanoma* OR “basal cell carcinoma*” OR “squamous cell carcinoma*”)

9,790

S11 TI((skin OR skins) N3 (cancer* OR neoplasm* OR tumor* OR tumour* OR carcinoma* OR malignan*))

1,506

S10 TI(vitaminD* OR “vitamin D” OR cholecalciferol* OR colecalciferol* OR ergocalciferol* OR calciferol* OR alfacalcidol* OR osteomalacia OR rickets OR “hypovitaminosis D”)

5,776

S9 (MH "Vitamin D Deficiency+/ED/PC/PF")

480

S8 (MH "Melanoma+/ED/PF/PC")

664

S7 (MH "Skin Neoplasms+/ED/PC/PF")

1,554

S6 TI(sunbath* OR “sun-bath*” OR suntan* OR tan OR tans OR tanning OR tanned OR sunbed* OR “sun-bed*” OR sunlamp* OR “sun-lamp*” OR solarium* OR solaria*) OR AB(sunbath* OR “sun-bath*” OR suntan* OR tan OR tans OR tanning OR tanned OR sunbed* OR “sun-bed*” OR sunlamp* OR “sun-lamp*” OR solarium* OR solaria*)

819

S5 TI(sunscreen* OR “sun-screen*” OR sunblock* OR “sun-block*” OR spf OR sunburn* OR “sun-burn*” OR “photo-damag*” OR “photodamag*” OR “photoag*” OR “photo-ag*” OR “photo-expos*” OR photoexpos*) OR AB(sunscreen* OR “sun-screen*” OR sunblock* OR “sun-block*” OR spf OR sunburn* OR “sun-burn*” OR “photo-damag*” OR “photodamag*” OR “photoag*” OR “photo-ag*” OR “photo-expos*” OR photoexpos*)

1,093

S4 AB((uv OR uva OR uvb OR uvc OR “ultra-violet” OR ultraviolet OR solar) N3 (ray* OR radiation OR irradiat* OR damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose*))

796

S3 TI((uv OR uva OR uvb OR uvc OR “ultra-violet” OR ultraviolet OR solar) N3 (ray* OR radiation OR irradiat* OR damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose*))

398

S2 TI((sun OR suns OR sunning OR sunshine OR sunlight*) N3 (damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose* OR underexpose* OR underexposure*)) OR AB((sun OR suns OR sunning OR sunshine OR sunlight*) N3 (damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose* OR underexpose* OR underexposure*))

1,492

S1 (MH "Sunlight+") OR (MH "Sunburn+") OR (MH "Sunscreening Agents")

5204

Database name	Cost Effectiveness Analysis (CEA) Registry
Database host	EBSCO Host
Database coverage dates	1937-2014
Searcher	Hannah Wood
Search date	07/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	2
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	2
Reference numbers of records in EndNote library	1229-12230
Number of records after de-duplication in EndNote library	1

CEA (basic, non-subscription access) only allows one search term to be entered at a time and there are no options to export search results. Returned records were screened in the database and only those about public health interventions, risk communication or attitudes, knowledge or understanding of sun exposure were added to EndNote. Records for studies of clinical interventions were not added to EndNote. Potentially relevant records were not added to EndNote if the citation had been identified by another database and previously downloaded.

sun = 49 results.

48 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 potentially relevant record with citation already in EndNote. 0 records added to EndNote.

sunlight = 0 results

sunshine = 1 result.

1 record of clearly irrelevant clinical intervention (drugs or screening methods), 0 records added to EndNote.

sunning = 1 result

1 record of clearly irrelevant clinical intervention (drugs or screening methods), 0 records added to EndNote.

ultraviolet = 2 results

2 records of clearly irrelevant clinical intervention (drugs or screening methods), 0 records added to EndNote.

sunscreen = 1 result.

1 potentially relevant record with citation already in EndNote. 0 records added to EndNote.

sunblock = 0 results.

spf = 0 results.

sunburn = 0 results.

photo = 51 results.

51 records of clearly irrelevant clinical interventions (drugs or screening methods). 0 records added to EndNote.

photodamage =0 results

photoaging = 0 results

photoexposure = 0 results

sunbathe =0 results

sunbathing = 0 results

suntan = 0 results

sunbed = 0 results

tanning = 0 results

solarium = 0 results

solaria = 0 results

skin = 51 results

50 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 potentially relevant record with citation already in EndNote. 0 records added to EndNote.

melanoma = 13 results

9 records of clearly irrelevant clinical interventions (drugs or screening methods), 2 potentially relevant record with citation already in EndNote. 2 records added to EndNote.

rickets = 0 results

vitamin d = 19 results

19 records of clearly irrelevant clinical interventions (drugs or screening methods), 0 records added to EndNote.

Skinsafe = 0 results

Sunsafe= 0 results

Sunsmart= 0 results

Sunwise = 0 results

Kidskin= 0 results

Shunburn= 0 results

Poolcool= 0 results

Database name	Social Care Online
Database host	http://www.scie-socialcareonline.org.uk/ (Advanced search BETA site)
Database coverage dates	1980s to current
Searcher	Hannah Wood
Search date	10/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	56
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	41 (15 direct to duplicate library)
Reference numbers of records in EndNote library	13015-13055
Number of records after de-duplication in EndNote library	40

Advanced search:

sun OR sunlight OR sunshine OR sunburn* OR sunscreen* OR suntan* OR sunbed* OR uv OR uva OR uvb OR spf OR tan OR tanning OR sunning OR ultraviolet OR sunblock OR solarium OR solaria

Search title field – 15 records
Search abstract field – 25 records

rickets OR “vitamin d” OR “skin cancer” OR “skin cancers” OR melanoma* OR “skin safe” OR skinsafe OR sunsmart OR sunwise OR kidskin OR “kid skin” OR shunburn OR “shun burn” OR poolcool OR “pool cool”

Search title field – 4 records
Search abstract field – 12 records

Database name	HEED
Database host	EBSCO Host
Database coverage dates	1983-2014
Searcher	Hannah Wood
Search date	14/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	297
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	291 (8 direct to Duplicate library)
Reference numbers of records in EndNote library	15039-15329
Number of records after de-duplication in EndNote library	206

Query Limiters/Expanders Last Run Via Results

S12 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 Limiters - Published Date: 19940101-20141231
Database - HEED: Health Economic Evaluations Database 297

S11 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
Database - HEED: Health Economic Evaluations Database 312

S10 TX(skinsafe* OR sunsafe* OR sunsmart* OR sunwise* OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn”)
Database - HEED: Health Economic Evaluations Database 2

S9 TI(melanoma* OR “basal cell carcinoma*” OR “squamous cell carcinoma*”)
Database - HEED: Health Economic Evaluations Database 104

S8 TI((skin OR skins) N3 (cancer* OR neoplasm* OR tumor* OR tumour* OR carcinoma* OR malignan*))
Database - HEED: Health Economic Evaluations Database 27

S7 TI(vitaminD* OR “vitamin D” OR cholecalciferol* OR colecalciferol* OR ergocalciferol* OR calciferol* OR alfacalcidol* OR osteomalacia OR rickets OR “hypovitaminosis D”)
Database - HEED: Health Economic Evaluations Database 33

S6 TX(sunbath* OR “sun-bath*” OR suntan* OR tan OR tans OR tanning OR tanned OR sunbed* OR “sun-bed*” OR sunlamp* OR “sun-lamp*” OR solarium* OR solaria*)
Database - HEED: Health Economic Evaluations Database 123

S5 TX(sunscreen* OR “sun-screen*” OR sunblock* OR “sun-block*” OR spf OR sunburn* OR “sun-burn*” OR “photo-damag*” OR “photodamag*” OR “photoag*” OR “photo-ag*” OR “photo-expos*” OR photoexpos*)
Database - HEED: Health Economic Evaluations Database 11

S4 TX((uv OR uva OR uvb OR uvc OR “ultra-violet” OR ultraviolet OR solar) N3 (ray* OR radiation OR irradiat* OR damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose*))
Database - HEED: Health Economic Evaluations Database 11

S3 TX((sun OR suns OR sunning OR sunshine OR sunlight*) N3 (damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose* OR underexpose* OR underexposure*))
Database - HEED: Health Economic Evaluations Database 8

S2 (ZW "melanoma") OR (ZW "cancer - skin") OR (ZW "vitamin deficiency")
Database - HEED: Health Economic Evaluations Database 77

S1 (ZE "sunlight adverse effects") OR (ZE "sunscreening agents economics") OR (ZE "sunscreening agents therapeutic use") OR (ZE "ultraviolet rays adverse effects")

Database - HEED: Health Economic Evaluations Database 8

Database name	**Applied Social Sciences Index and Abstracts (ASSIA)**
Database host	Proquest
Database coverage dates	1987-current
Searcher	Hannah Wood
Search date	19/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	964
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	195 (769 direct to Duplicate Library)
Reference numbers of records in EndNote library	15330-15524
Number of records after de-duplication in EndNote library	106

Problem with Proquest interface meant that it was not possible to undertake complex multi-line searches; the database kept timing out. This was confirmed as a known issue with Proquest support. Basic searches undertaken, downloaded one search-line at a time as the interface crashed when trying to combine lines with OR.

SU.EXACT.EXPLODE("Sunscreens") OR SU.EXACT("Sunbeds") OR SU.EXACT("Sunburn") OR SU.EXACT("Sunbathing") OR SU.EXACT("Sunlight") OR SU.EXACT("Suntan")Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 235°

TI,AB((sun OR suns OR sunning OR sunshine OR sunlight*) N/3 (damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose* OR underexpose* OR underexposure*))Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 277

TI,AB((uv OR uva OR uvb OR uvc OR “ultra-violet” OR ultraviolet OR solar) N/3 (ray* OR radiation OR irradiat* OR damag* OR protect* OR safe OR safety OR risk* OR benefit* OR beneficial OR index OR indexes OR exposure* OR overexposure* OR expose* OR overexpose*))Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 96

TI,AB(sunscreen* OR “sun-screen*” OR sunblock* OR “sun-block*” OR spf OR sunburn* OR “sun-burn*”)Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 144°

TI,AB(sunbath* OR “sun-bath*” OR suntan* OR tan OR tans OR tanning OR tanned)Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1999; 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014 - 155

TI,AB(“photo-damag*” OR “photodamag*” OR “photoag*” OR “photo-ag*” OR “photo-expos*” OR photoexpos*) Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1999; 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 10

TI,AB(kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn”) Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1999; 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 2

TI,AB(skinsafe OR sunsafe OR sunsmart OR sunwise OR "pool cool") Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1999; 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 20

TI,AB(sunbed* OR “sun-bed*” OR sunlamp* OR “sun-lamp*” OR solarium* OR solaria*)Limits applied
Databases:
Applied Social Sciences Index and Abstracts (ASSIA)
Narrowed by: Year: 1994; 1995; 1996; 1997; 1999; 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014
Applied Social Sciences Index and Abstracts (ASSIA) 25

Database name	**Guidelines International Network (GIN)**
Database host	http://www.g-i-n.net/library/
Database coverage dates	Not found
Searcher	Hannah Wood
Search date	21/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	17
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	17
Reference numbers of records in EndNote library	16806-16822
Number of records after de-duplication in EndNote library	17

International Guideline Library Advanced Search.

Search English language only, all authors, all publication status, all publication types, all countries.

sun*= 9 records. 7 clearly irrelevant (clinical interventions/diagnostics), 1 record referring to current project, 1 potentially relevant record added to EndNote.

ultra-violet OR ultraviolet= 2 records, both clearly irrelevant (clinical interventions/diagnostics), 0 potentially relevant records added to EndNote.

spf = 0 records.

photo* = 12 records, all clearly irrelevant (clinical interventions/diagnostics), 0 potentially relevant records added to EndNote.

tan*=1 record, clearly irrelevant (clinical interventions/diagnostics), 0 potentially relevant records added to EndNote

solarium = 0 records

solaria = 0 records

skin cancer* OR melanoma = 51 records. 49 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 potentially relevant record with citation already in EndNote, 1 record of relevant NICE guidance yielding 15 additional evidence papers. 15 records added to EndNote.

rickets OR vitamin d = 7 records. 5 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 record for guideline in-process with no available outputs, 1 record added to EndNote.

Database name	**National Guidelines Clearing House**
Database host	http://www.guideline.gov/
Database coverage dates	Not found
Searcher	Hannah Wood
Search date	21/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	1
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	1
Reference numbers of records in EndNote library	16823
Number of records after de-duplication in EndNote library	1

Search: sun or suns or sunning or sunshine or sunlight. 65 results. 63 records of clearly irrelevant clinical interventions (drugs or screening methods), 2 potentially relevant records with citations already in EndNote, 0 records added to EndNote.

Search: uv or uva or uvb or ultraviolet. 38 results. 36 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 potentially relevant record with citation already in EndNote, 1 record added to EndNote.

Search: sunscreen* or sunblock* or spf or sunburn* 16 results. 14 records of clearly irrelevant clinical interventions (drugs or screening methods), 2 potentially relevant records with citation already in EndNote, 0 records added to EndNote.

Search: sunbath* or suntan* or tanning or sunbed* or sunlamp* or solarium* or solaria*. 77 results. 76 records of clearly irrelevant clinical interventions (drugs or screening methods), 1 potentially relevant record with citation already in EndNote, 0 records added to EndNote.

As this resource searches the full text of guidelines it was not necessary to search using the vitamin d deficiency or skin cancer terms. We are only interested in interventions to prevent these conditions that mention sun or uv exposure; these are captured by the terms above.

Database name	Public Health Observatories webpages
Database host	http://www.apho.org.uk/
Database coverage dates	Up to April 2013 when PHO became part of Public Health England.
Searcher	Hannah Wood
Search date	21/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	7
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	7
Reference numbers of records in EndNote library	16824-16830
Number of records after de-duplication in EndNote library	7

Browsed “Publications”, “Tools & Data” and “Work Streams” sections of the webpages.

Searched using “Advanced search” function. Limit 1994-2014. Note that search engine finds any occurrence of term, even within words, making truncation unnecessary. Sun will find sunburn, sunscreen, sunlight etc. as well as irrelevant terms like Sunderland. No Boolean OR available.

Returned results of each search were scanned for potentially relevant items. Choice of items to view and selection for further consideration was based on the searchers judgement.

sun-sunderland: 47 reports, 5 collections. 7 records selected and added to EndNote.

ultraviolet: 3 records, 0 added to EndNote

ultra-violet: 4 records, 0 added to EndNote

tanning: 7 records, 0 added to EndNote

Database name	The Trials Register of Promoting Health Interventions (TRoPHI)
Database host	EPPI Centre Database (https://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=5)
Database coverage dates	Information not found. States: “Quarterly sensitive searches since August 2004”
Searcher	Hannah Wood
Search date	21/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	4
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	4
Reference numbers of records in EndNote library	16831-16834
Number of records after de-duplication in EndNote library	4

1 Freetext: "sun" OR "suns" OR "sunning" OR "sunshine" OR "sunlight" 102
2 Freetext: "uv" OR "uva" OR "uva" OR "uvb" OR "ultraviolet" OR "ultra violet" 20
3 Freetext: "sunscreen*" OR "sunblock*" OR "sunburn*" OR "spf" 43
4 Freetext: "sunbath*" OR "suntan*" OR "tan" OR "tans" OR "tanning" OR "tanned" OR "sunbed*" OR "sunlamp*" OR "solarium" OR "solaria" 30
5 Freetext: "kid skin" OR "kidskin" OR "slipslapslop" OR "slip slap slop" OR "shunburn" OR "shun burn" 2
6 Freetext: "skinsafe" OR "sunsafe" OR "sunsmart" OR "sunwise" OR "pool cool" 6
7 1 OR 2 OR 3 OR 4 OR 5 OR 6 221

No export options – records screened in database to remove obviously irrelevant records. Records only added to EndNote if the record had not already been found by a previous search resource.

16 records clearly irrelevant, 101 records already identified and in EndNote, 4 new records added to EndNote

Database name	**Database of promoting health effectiveness reviews (DoPHER)**
Database host	EPPI Centre Database (https://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=2)
Database coverage dates	Information not found. States "Since January 2006 DoPHER is updated quarterly to keep it as current as possible."
Searcher	Hannah Wood
Search date	21/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	1
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	1
Reference numbers of records in EndNote library	16835
Number of records after de-duplication in EndNote library	1

1 Freetext: "sun" OR "suns" OR "sunning" OR "sunshine" OR "sunlight" 21
2 Freetext: "uv" OR "uva" OR "uva" OR "uvb" OR "ultraviolet" OR "ultra violet" 9
3 Freetext: "sunscreen*" OR "sunblock*" OR "sunburn*" OR "spf" 6
4 Freetext: "sunbath*" OR "suntan*" OR "tan" OR "tans" OR "tanning" OR "tanned" OR "sunbed*" OR "sunlamp*" OR "solarium" OR "solaria" 2
5 Freetext: "kid skin" OR "kidskin" OR "slipslapslop" OR "slip slap slop" OR "shunburn" OR "shun burn" 0
6 Freetext: "skinsafe" OR "sunsafe" OR "sunsmart" OR "sunwise" OR "pool cool" 0
7 1 OR 2 OR 3 OR 4 OR 5 OR 6 26

No export options – records screened in database to remove obviously irrelevant records. Records only added to EndNote if the record had not already been found by a previous search resource.

2 records clearly irrelevant, 23 records already identified and in EndNote, 1 new record added to EndNote

Database name	NICE webpages
Database host	http://www.nice.org.uk/
Database coverage dates	Information not found.
Searcher	Hannah Wood
Search date	24/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	4
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	4
Reference numbers of records in EndNote library	16836-16839
Number of records after de-duplication in EndNote library	4

Browsed public health guidance.

Searched whole website using the following terms:

Sun
Sunlight
Sunning
Sunshine
UV
UVA
UVB
Ultraviolet
Ultra violet
Sunscreen
Sunblock
Sunburn
SPF
Sunbathe
Suntan
Tan
Tanning
Sunbed
Sunlamp
Solarium
Solaria

Returned results of each search were scanned for potentially relevant items. Choice of items to view and selection for further consideration was based on the searchers judgement.

Records only added to EndNote if the record had not already been found by a previous search resource.

4 new records added to EndNote

Database name	NHS Evidence
Database host	https://www.evidence.nhs.uk/
Database coverage dates	Information not found.
Searcher	Hannah Wood
Search date	24/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	7
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	7
Reference numbers of records in EndNote library	16840-16846
Number of records after de-duplication in EndNote library	7

NICE Evidence does not provide the functionality to undertake a sufficiently precise search (for example it is not possible to specify the field to be searched, resulting in the retrieval of lots of records where the authors are Sun or Tan). In order to ensure the volume of records were manageable, and that the proportion of obviously irrelevant results were not overwhelming, a very pragmatic approach was taken.

For each search, the first 200 'most relevant' returned results of each search were scanned for potentially relevant items. Relevance ranking was determined by the Google algorithm. Choice of items to view and selection for further consideration was based on the searchers judgement. Records were only added to EndNote if the record had not already been found by a previous search resource.

(sun OR suns OR sunning OR sunshine OR sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf) AND (risk* OR benefit* OR protect* OR exposure* OR safe*) AND (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR believe OR perception* OR perceive* OR view OR views OR prefer* OR intention* OR habit* OR practice* OR comply OR complies OR compliance OR adhere* OR adherence OR concordance OR accordance OR accept* OR motivation* OR awareness* OR uptake OR up-take OR takeup OR take-up OR barrier* OR facilitator* OR utilis* OR utiliz*) Filtered using the "Areas of Interest Option" - Public Health. 1224 records. 200 records screened, 4 new potentially relevant records added to EndNote.

(sun OR suns OR sunning OR sunshine OR sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf) AND (risk* OR benefit* OR protect* OR exposure* OR safe*) AND (notif* OR information OR message* OR communicat* OR counsel* OR marketing OR dissemin* OR advice OR advise* OR advising OR promot*) Filtered using the "Areas of Interest Option" - Public Health. 1250 records. 200 records screened, 0 new potentially records added to EndNote.

skinsafe OR sunsafe OR sunsmart OR sunwise OR "pool cool" OR kidskin OR "kid skin" OR slipslopslap OR "slip slop slap" OR shunburn OR "shun burn" 47 records. 47 reocrds screened. 1 new potentially record added to EndNote.

Database name	OAISTER
Database host	WorldCat (http://oaister.worldcat.org/)
Database coverage dates	Information not found.
Searcher	Hannah Wood
Search date	24/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	319
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	302 (17 direct to Duplicate Library)
Reference numbers of records in EndNote library	16847-17148
Number of records after de-duplication in EndNote library	290

'kw:skinsafe OR sunsafe OR sunsmart OR sunwise OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn”' > '1994..2014' > 'English' 6 results

'kw:(sun OR suns OR sunning OR sunshine OR sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf) AND (risk* OR benefit* OR protect* OR exposure* OR safe*) AND (notif* OR information OR message* OR communicat* OR counsel* OR marketing OR dissemin* OR advice OR advise* OR advising OR promot*)' > '1994..2014' > 'English' 247 results

'kw:(sun OR suns OR sunning OR sunshine OR sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf) AND (risk* OR benefit* OR protect* OR exposure* OR safe*) AND (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR believe OR perception* OR perceive* OR view OR views OR prefer* OR intention* OR habit* OR practice* OR comply OR complies OR compliance OR adhere* OR adherence OR concordance OR accordance OR accept* OR motivation* OR awareness* OR uptake OR up-take OR takeup OR take-up OR barrier* OR facilitator* OR utilis* OR utiliz*)' > '1994..2014' > 'English' 87 results

Total: 319 records once individual search lines deduplicated in OAISTER

Database name	OpenGrey
Database host	http://www.opengrey.eu/
Database coverage dates	Information not found.
Searcher	Hannah Wood
Search date	24/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	6
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	6
Reference numbers of records in EndNote library	17149-17154
Number of records after de-duplication in EndNote library	6

+skinsafe OR +sunsafe OR +sunsmart OR +sunwise OR "pool cool" OR +kidskin OR "kid skin" OR +slipslopslap OR "slip slop slap" OR +shunburn OR "shun burn" 0 results

(+sun OR +suns OR +sunning OR +sunshine OR +sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR +uv OR +uva OR +uvb OR +uvc OR +ultraviolet OR +ultra-violet OR +tan OR +tans OR +tanning OR +tanned OR +spf) NEAR/5 (risk* OR benefit* OR protect* OR exposure* OR safe*) NEAR/5 (notif* OR +information OR message* OR communicat* OR counsel* OR +marketing OR dissemin* OR +advice OR advise* OR +advising OR promot*) 1 result

(+sun OR +suns OR +sunning OR +sunshine OR +sunlight OR sunbath* OR suntan* OR sunbed* OR sunlamp* OR sunscreen* OR sunblock* OR solarium* OR solaria* OR +uv OR +uva OR +uvb OR +uvc OR +ultraviolet OR +ultra-violet OR +tan OR +tans OR +tanning OR +tanned OR +spf) NEAR/5 (risk* OR benefit* OR protect* OR exposure* OR safe*) NEAR/5 (knowledg* OR attitude* OR behavio* OR value* OR understand* OR belief* OR +believe OR perception* OR perceive* OR +view OR +views OR prefer* OR intention* OR habit* OR practice* OR +comply OR +complies OR +compliance OR adhere* OR +adherence OR +concordance OR +accordance OR accept* OR motivation* OR awareness* OR +uptake OR +up-take OR +takeup OR +take-up OR barrier* OR facilitator* OR utilis* OR utiliz*) 5 results

WHOLIS – constant error message – last checked 10/04/14
"The OPAC is currently unavailable. Please try again later"
http://www.who.int/library/databases/en/

Database name	**Google**
Database host	www.google.co.uk
Database coverage dates	Information not found.
Searcher	Hannah Wood
Search date	24/03/14
Search strategy checked by	Mick Arber (information specialist YHEC)
Number of records retrieved	26
Name of EndNote library	NICE sun Review 2 and 3.enl
Number of records loaded into EndNote	26
Reference numbers of records in EndNote library	17155-17180
Number of records after de-duplication in EndNote library	26

For each search, the first 100 'most relevant' returned results (ten pages) of each search were scanned for potentially relevant items. Relevance ranking was determined by the Google algorithm. Choice of items to view and selection for further consideration was based on the searchers judgement. Records were only added to EndNote if the record had not already been found by a previous search resource.

Given the volume of material the searches were restricted to 2009 to current (the date of the previous NICE public health guidance on skin cancer prevention). This ensures that the most recent results are identified.

Note: when search is limited by date, Google does not provide information on the number of records returned.

site:.gov.uk skinsafe OR sunsafe OR sunsmart OR sunwise OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn” 26 records added to EndNote

site:.nhs.uk skinsafe OR sunsafe OR sunsmart OR sunwise OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn” 0 records added to EndNote

site:.apho.org.uk skinsafe OR sunsafe OR sunsmart OR sunwise OR “pool cool” OR kidskin OR “kid skin” OR slipslopslap OR “slip slop slap” OR shunburn OR “shun burn” 0 records added to EndNote
site:.gov.uk sun OR suns OR sunshine OR sunlight OR sunbath OR sunbathe OR sunbathing OR suntan OR sunbed OR sunlamp OR sunscreen OR sunblock OR solarium OR solaria OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf 0 records added to EndNote

site:.nhs.uk sun OR suns OR sunshine OR sunlight OR sunbath OR sunbathe OR sunbathing OR suntan OR sunbed OR sunlamp OR sunscreen OR sunblock OR solarium OR solaria OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf 0 records added to EndNote

site:.apho.org.uk sun OR suns OR sunshine OR sunlight OR sunbath OR sunbathe OR sunbathing OR suntan OR sunbed OR sunlamp OR sunscreen OR sunblock OR solarium OR solaria OR uv OR uva OR uvb OR uvc OR ultraviolet OR ultra-violet OR tan OR tans OR tanning OR tanned OR spf 0 records added to EndNote

The following webpages were also browsed for additional evidence on 25/03/14 identifying 21 records which were added to EndNote:

British Association of Dermatologists
http://www.bad.org.uk/

British Association of Skin Cancer Specialist Nurses
http://bascsn.org/

Cancer Research UK AND SunSmart
http://www.cancerresearchuk.org/, **http://www.sunsmart.org.uk/**

SunSmart team emailed for full sun smart publications 3rd April 2014. No reply received to date.

Karen Clifford Skin Cancer Charity
http://www.skcin.org/

Teenage Cancer Trust
http://www.teenagecancertrust.org

ShunBurn team emailed for full details of ShunBurn Survey on attitudes to sun exposure 3rd April 2014. We were unable to access any information beyond a press release.

Hi Hannah,

I have attached our Shunburn press release that my Comms team have sent to me. Please let me know if you need further info.

Best wishes,
Naz

Macmillan Cancer Support
http://www.macmillan.org.uk/

Skin Cancer Hub (South West PHO)
http://www.swpho.nhs.uk/skincancerhub/default.aspx – includes http://www.swpho.nhs.uk/skincancerhub/default.aspx?QN=INTER_ALL. The site included a database of small, local sun exposure interventions, most of which did not provide any evaluation information. The reviewers did not feel there was enough time to follow these up, however their presence is noted.

SunSmart Australia and Cancer Council Victoria
http://www.sunsmart.com.au/ and http://www.cancervic.org.au/pub-research-area-skin-cancer.html. This site included a number of SunSmart evaluations that did not seem to be publically available. Given the volume of literature already identified on SunSmart, and the time restrictions, we did not follow these up.

Vitamin D Mission http://www.vitamindmission.co.uk/

APPENDIX B

Further Details on the Review Methods

B.1: RECORD SELECTION PROCESS

Record selection was undertaken using several passes. The first pass was undertaken in EndNote by an experienced information specialist. It removed obviously irrelevant records, specifically studies which were:

- Ineligible study designs;
- Animal studies;
- In languages other than English;
- Published before 1994;
- Anonymous or had no author;
- Conference abstracts;
- About diagnosing disease;
- Laboratory studies;
- Environmental science research;
- Assessing interventions or risk factors for diseases not related to UV exposure;
- Not about human health;
- Included only because of the author name 'Tan'.

The remaining records were then loaded into DistillerSR systematic reviewing software. Only studies published in the period (2004 – 2014) were loaded as per initial discussions with NICE. Following protocol amendment studies published 2008 onwards were included in the review.

Second pass record selection was then undertaken by two reviewers independently, using the title and abstract of the records. The reviewers sought to identify the studies most likely to contain information relating to the barriers or facilitators faced by interventions which conveyed information relating to the health risks and benefits of UV exposure, or were likely to modify UV exposure practices. To do this a screening form based on the eligibility criteria in the protocol and agreed by NICE was created in DistiillerSR, to assist the reviewing process.

The record selection inter-rater reliability rate (IRR) was calculated by DistillerSR on an ongoing basis. Over the course of the second pass the IRR was approximately 0.93. Lower rates of 0.82, 0.85 and 0.89 were calculated between reviewers over the first 100 records that each respectively reviewed. These values then rose as reviewer proficiency increased following discussion.

Third pass record selection within DistillerSR was also undertaken by two reviewers independently, using the full text of the records. At this stage reviewers sought to identify studies that m*et al*l of the eligibility criteria and could be included in the review. For the third pass the inter-rater reliability (IRR) had an overall weighted kappa of 0.57 (moderate).

B.2: AMSTAR QUALITY ASSESSMENT TOOL

Source: Shea BJ, Grimshaw JM, Wells GA, Boers M, Andersson N, Hamel C, Porter AC, Tugwell P, Moher D, Bouter LM. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Res Methodol. 2007;7:10.

1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.	□ Yes □ No □ Can't answer □ Not applicable
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	□ Yes □ No □ Can't answer □ Not applicable
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	□ Yes □ No □ Can't answer □ Not applicable
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	□ Yes □ No □ Can't answer □ Not applicable
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	□ Yes □ No □ Can't answer □ Not applicable
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	□ Yes □ No □ Can't answer □ Not applicable
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	□ Yes □ No □ Can't answer □ Not applicable
8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	□ Yes □ No □ Can't answer □ Not applicable
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	□ Yes □ No □ Can't answer □ Not applicable
10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	□ Yes □ No □ Can't answer □ Not applicable
11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	□ Yes □ No □ Can't answer □ Not applicable

B.3: HEALTH BELIEF MODEL

Thematic synthesis was conducted using the framework of the Health Belief Model. The Health Belief Model is an explanatory framework through which to interpret findings. Developed in the 1950's, the Health Belief Model is a widely applied conceptual framework for understanding health behaviours (Table B.1). The Health Belief model tries to explain health actions through the interaction of three sets of beliefs: perceived susceptibility; perceived seriousness; perceived benefits and disadvantages. We used this model as the starting point for developing codes to analyze the findings, where themes identified contributed to the concepts within the Health Belief Model. The study text was coded and descriptive themes were developed.

Table B.1: Health Belief model framework

Concept	Definition	Application
Perceived susceptability	One's opinion of the chances of getting a condition	Define population(s) at risk, risk levels; personalize risk based on a person's fetures or behaviour; heighten perceived susceptibility if too low.
Perceived Severity	One's opinion of how serious a condition and its consequences are	Specify the consequences of the risk and the condition
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance.
Cues to action	Strategies to activate 'readiness'	Provide how-to information, promote awareness, reminders.
Self-efficacy	Confidence in one's ability to take action.	Provide training, guidance in performing action.

APPENDIX C

Excluded Studies Table for the Review of Effects and Cost-Effectiveness and the Barriers and Facilitators Review

Bibliographic Information	Exclusion Reason
I. Schoenmakers, R. M. Francis, E. McColl, T. Chadwick, G. R. Goldberg, C. Harle, A. Yarnall, J. Wilkinson, J. Parker, A. Prentice and T. Aspray. Vitamin D supplementation in older people (VDOP): Study protocol for a randomised controlled intervention trial with monthly oral dosing with 12,000 IU, 24,000 IU or 48,000 IU of vitamin D3. Trials [Electronic Resource]. 2013. 14:299	Protocol only
C. J. Heckman, J. Cohen-Filipic, S. Darlow, J. D. Kloss, S. L. Manne and T. Munshi. Psychiatric and addictive symptoms of young adult female indoor tanners. American Journal of Health Promotion. 2014. 28:168-74	Not focused on risk communication
A. Chandrasena, K. Amin and B. Powell. Dying for a tan: a survey to assess solarium adherence to world health organization guidelines in australia, new zealand, and the United kingdom. Eplasty [Electronic Resource]. 2013. 13:e62	Questionnaire about sun tanning companies and their adherence to policies
B. Bonevski, A. Guillaumier, C. Paul and R. Walsh. The vocational education setting for health promotion: a survey of students' health risk behaviours and preferences for help. Health Promotion Journal of Australia. 2013. 24:185-91	Prevalence data only
M. Falk. Self-estimation or Phototest Measurement of Skin UV Sensitivity and its Association with People's Attitudes Towards Sun Exposure. Anticancer Research. 2014. 34:797-803	not an intervention of interest
R. N. Carey, D. C. Glass, S. Peters, A. Reid, G. Benke, T. R. Driscoll and L. Fritschi. Occupational exposure to solar radiation in Australia: who is exposed and what protection do they use?. Australian & New Zealand Journal of Public Health. 2014. 38:54-9	Reports only prevalence data about occupational exposure to UV.
A. Garg, J. Wang, S. B. Reddy, J. Powers, R. Jacob, M. Powers, K. Biello, R. Cayce, S. Savory, L. Belazarian, E. Domingues, A. Korzenko, L. Wilson, J. M. Grant-Kels, P. George, L. Robinson-Bostom, S. C. Trotter and A. C. Geller. The Integrated Skin Exam film: an educational intervention to promote early detection of melanoma by medical students. Journal of the American Academy of Dermatology. 2014. 70:115-9	melanoma identification training
A. Goldenberg, B. T. Nguyen and S. I. Brian Jiang. Knowledge, Understanding, and Use of Preventive Strategies against Nonmelanoma Skin Cancer in Healthy and Immunosuppressed Individuals Undergoing Mohs Surgery. Dermatologic Surgery. 2014. 40:93-100	Patients with nonmelanoma skin cancer
E. Janssen, E. A. Waters, L. van Osch, L. Lechner and H. de Vries. The importance of affectively-laden beliefs about health risks: the case of tobacco use and sun protection. Journal of Behavioral Medicine. 2014. 37:11-21	not an intervention of interest
H. Dixon, C. Warne, M. Scully, S. Dobbinson and M. Wakefield. Agenda-setting effects of sun-related news coverage on public attitudes and beliefs about tanning and skin cancer. Health Communication. 2014. 29:173-81	not an intervention study in an OECD country
Andsoy, II, A. Gul, A. O. Sahin and H. Karabacak. What Turkish Nurses Know and Do about Skin Cancer and Sun Protective Behavior. Asian Pacific Journal of Cancer Prevention: Apjcp. 2013. 14:7663-8	not an intervention of interest
S. Klostermann, G. Bolte and G. M. E. S. Group. Determinants of inadequate parental sun protection behaviour in their children - Results of a cross-sectional study in Germany. International Journal of Hygiene & Environmental Health. 2014. 217:363-9	Prevalence data only

Bibliographic Information	Exclusion Reason
F. Grange, A. S. Woronoff, R. Bera, M. Colomb, B. Lavole, E. Fournier, F. Arnold and C. Barbe. Efficacy of a general practitioner training campaign for early detection of melanoma in France. British Journal of Dermatology. 2014. 170:123-9	melanoma identification
K. L. Akamine, C. J. Gustafson, S. A. Davis, M. M. Levender and S. R. Feldman. Trends in Sunscreen Recommendation Among US Physicians. JAMA Dermatology. 2014. 150:51-5	Reports prevalence of physician sunsmart recommendations
E. Tella, A. Beauchet, I. Vouldoukis, J. F. Sei, P. Beaulieu, M. L. Sigal and E. Mahe. French teenagers and artificial tanning. Journal of the European Academy of Dermatology & Venereology. 2013. 27:e428-32	not an intervention of interest
M. Oldenburg, B. Kuechmeister, U. Ohnemus, X. Baur and I. Moll. Extrinsic skin ageing symptoms in seafarers subject to high work-related exposure to UV radiation. European Journal of Dermatology. 2013. 23:663-70	Not focused on risk communication
H. Kang and K. Walsh-Childers. Sun-care product advertising in parenting magazines: what information does it provide about sun protection?. Health Communication. 2014. 29:1-12	Study is about the content of magazine advertising. Does not address barriers and/or facilitators and does not report changes in peoples behaviour
S. A. Lava, G. D. Simonetti, A. A. Bianchetti, A. Ferrarini and M. G. Bianchetti. Prevention of vitamin D insufficiency in Switzerland: a never-ending story. International Journal of Pharmaceutics. 2013. 457:353-6	Study is about oral vitamin D supplementation rather than sunlight
A. Buendia-Eisman, J. Conejo-Mir, L. Prieto, I. Castillejo, J. C. Moreno-Gimenez and S. Arias-Santiago. "Buen Rayito Study": awareness, attitudes and behavior of teenagers to sunlight through a web based system in Spain. European Journal of Dermatology. 2013. 23:505-9	Not focused on risk communication
M. K. Tripp, P. M. Diamond, S. W. Vernon, P. R. Swank, P. Dolan Mullen and E. R. Gritz. Measures of parents' self-efficacy and perceived barriers to children's sun protection: construct validity and reliability in melanoma survivors. Health Education Research. 2013. 28:828-42	Study in people diagnosed with melanoma
L. Buchanan. Slip, slop, slap, seek, slide - is the message really getting across?. Dermatology Online Journal. 2013. 19:19258	Non systematic review
C. M. Wheat, N. O. Wesley and B. A. Jackson. Recognition of skin cancer and sun protective behaviors in skin of color. Journal of Drugs in Dermatology: JDD. 2013. 12:1029-32	No intervention, OECD
A. K. Day, M. Oxlad and R. M. Roberts. Predictors of sun-related behaviors among young women: comparisons between outdoor tanners, fake tanners, and tan avoiders. Journal of American College Health. 2013. 61:315-22	not an intervention of interest
A. I. Reeder, A. Gray and J. P. McCool. Occupational sun protection: workplace culture, equipment provision and outdoor workers' characteristics. Journal of Occupational Health. 2013. 55:84-97	not an intervention of interest
T. Batista, M. C. Fissmer, K. R. Porton and F. Schuelter-Trevisol. Assessment of sun protection and skin cancer prevention among preschool children. Revista Paulista de Pediatria. 2013. 31:17-23	Non-OECD. Reports incidence and associations only
V. K. Nahar, M. A. Ford, J. S. Hallam, M. A. Bass, A. Hutcheson and M. A. Vice. Skin Cancer Knowledge, Beliefs, Self-Efficacy, and Preventative Behaviors among North Mississippi Landscapers. Dermatology research & Practice. 2013. 2013:496913	not an intervention of interest

Bibliographic Information	Exclusion Reason
K. D. Hoerster and J. A. Mayer. Using research data to impact consumer protection legislation: lessons learned from CITY100 dissemination efforts. Translational Behavioral Medicine. 2013. 3:264-70	Non-systematic review reporting how the data from the CITY100 project was used to legislate tanning bans in young people.
D. B. Buller, M. Berwick, J. Shane, I. Kane, K. Lantz and M. K. Buller. User-centered development of a smart phone mobile application delivering personalized real-time advice on sun protection. Translational Behavioral Medicine. 2013. 3:326-34	About the set up and testing of a mobile phone app.
M. Saridi, A. Toska, M. Rekleiti, G. Wozniak, A. Liachopoulou, A. Kalokairinou, K. Souliotis and K. Birbas. Sun-protection habits of primary students in a coastal area of Greece. Journal of Skin Cancer. 2012. 2012:629652	not an intervention of interest
J. L. Hay, C. Baguer, Y. Li, I. Orlow and M. Berwick. Interpretation of melanoma risk feedback in first-degree relatives of melanoma patients. Journal of Cancer Epidemiology Print. 2012. 2012:374842	Study about genetic risk of melanoma
M. Kljakovic, C. Davey, R. Sharma and D. Sharma. Clinical audit of health promotion of vitamin D in one general practice. Asia Pacific Family Medicine. 2012. 11:3	Does not report outcomes for sunlight
M. Mogensen and G. B. Jemec. The potential carcinogenic risk of tanning beds: clinical guidelines and patient safety advice. Cancer management and research. 2010. 2:277-82	Not a SR
B. A. Rabin, E. Nehl, T. Elliott, A. D. Deshpande, R. C. Brownson and K. Glanz. Individual and setting level predictors of the implementation of a skin cancer prevention program: a multilevel analysis. Implementation Science. 2010. 5:40	Study about implementation of interventions
R. Ashinoff, V. J. Levine, A. B. Steuer and C. Sedwick. Teens and tanning knowledge and attitudes. The Journal of Clinical & Aesthetic Dermatology. 2009. 2:48-50	not an intervention of interest
G. Cafri, J. K. Thompson, M. Roehrig, P. van den Berg, P. B. Jacobsen and S. Stark. An investigation of appearance motives for tanning: The development and evaluation of the Physical Appearance Reasons For Tanning Scale (PARTS) and its relation to sunbathing and indoor tanning intentions. Body Image. 2006. 3:199-209	Barriers/facilitators non-UK
M. Wickenheiser, M. K. Baker, R. Gaber, H. Blatt and J. K. Robinson. Sun protection preferences and behaviors among young adult males during maximum ultraviolet radiation exposure activities. International Journal of Environmental Research & Public Health [Electronic Resource]. 2013. 10:3203-16	Not focused on risk communication
G. G. McLeod, A. I. Reeder, A. R. Gray and R. McGee. Summer weekend sun exposure and sunburn among a New Zealand urban population, 1994-2006. New Zealand Medical Journal. 2013. 126:12-26	not an intervention, OECD
G. D. Kearney, C. S. Lea, J. Balanay, Q. Wu, J. W. Bethel, H. Von Hollen, K. Sheppard, R. Tutor-Marcom and J. Defazio. Assessment of sun safety behavior among farmers attending a regional farm show in North Carolina. Journal of Agromedicine. 2013. 18:65-73	Reports prevalence data only - no reasons for behaviour given
C. Galletly. Sunshine, supplements, CBT and more. Australian & New Zealand Journal of Psychiatry. 2013. 47:199-200	Non-systematic review
G. P. Guy, Jr., Z. Berkowitz, M. Watson, D. M. Holman and L. C. Richardson. Indoor tanning among young non-Hispanic white females. JAMA Internal Medicine. 2013. 173:1920-2	Not focused on risk communication

Bibliographic Information	Exclusion Reason
M. Janda, P. Youl, A. L. Marshall, H. P. Soyer and P. Baade. The HealthyTexts study: a randomized controlled trial to improve skin cancer prevention behaviors among young people. Contemporary Clinical Trials. 2013. 35:159-67	Baseline charactieristics of an RCT. No further data reported
K. Moore, B. J. Smith and K. Reilly. Community understanding of the preventability of major health conditions as a measure of health literacy. Australian Journal of Rural Health. 2013. 21:35-40	Not focused on risk communication
L. K. Dennis and J. B. Lowe. Does artificial UV use prior to spring break protect students from sunburns during spring break?. Photodermatology, Photoimmunology & Photomedicine. 2013. 29:140-8	Prevalence data only.
S. Surdu, E. F. Fitzgerald, M. S. Bloom, F. P. Boscoe, D. O. Carpenter, R. F. Haase, E. Gurzau, P. Rudnai, K. Koppova, J. Fevotte, G. Leonardi, M. Vahter, W. Goessler, R. Kumar and T. Fletcher. Occupational exposure to ultraviolet radiation and risk of non-melanoma skin cancer in a multinational European study. PLoS ONE [Electronic Resource]. 2013. 8:e62359	Not focused on risk communication
H. Jang, F. K. Koo, L. Ke, L. Clemson, R. Cant, D. R. Fraser, M. J. Seibel, M. Tseng, E. Mpofu, R. S. Mason and K. Brock. Culture and sun exposure in immigrant East Asian women living in Australia. Women & Health. 2013. 53:504-18	not an intervention of interest
A. I. Reeder, J. A. Jopson and A. R. Gray. Vitamin D insufficiency and deficiency: New Zealand general practitioners' perceptions of risk factors and clinical management. New Zealand Medical Journal. 2013. 126:49-61	Reports GPs perceptions only, not how they convey complex information to patients.
D. P. Kim, I. Chabra, P. Chabra and E. C. Jones. Sunscreen use while driving. Journal of the American Academy of Dermatology. 2013. 68:952-6	Not focused on risk communication
A. C. Green, L. Marquart, S. L. Clemens, C. M. Harper and P. K. O'Rourke. Frequency of sunburn in Queensland adults: still a burning issue.[Erratum appears in Med J Aust. 2013 Jul 22;199(2):102]. Medical Journal of Australia. 2013. 198:431-4	Not focused on risk communication
R. L. Thomson, S. Spedding, G. D. Brinkworth, M. Noakes and J. D. Buckley. Seasonal effects on vitamin D status influence outcomes of lifestyle intervention in overweight and obese women with polycystic ovary syndrome. Fertility & Sterility. 2013. 99:1779-85	No outcomes of interest
A. Pirrone, T. Capetola, E. Riggs and A. Renzaho. Vitamin D deficiency awareness among African migrant women residing in high-rise public housing in Melbourne, Australia: a qualitative study. Asia Pacific Journal of Clinical Nutrition. 2013. 22:292-9	Not an intervention study
J. Fogel and F. Krausz. Watching reality television beauty shows is associated with tanning lamp use and outdoor tanning among college students. Journal of the American Academy of Dermatology. 2013. 68:784-9	not an intervention
D. M. Holman and M. Watson. Correlates of intentional tanning among adolescents in the United States: a systematic review of the literature. Journal of Adolescent Health. 2013. 52:S52-9	not an intervention of interest
E. Janssen, L. van Osch, H. de Vries and L. Lechner. Examining direct and indirect pathways to health behaviour: the influence of cognitive and affective probability beliefs. Psychology & Health. 2013. 28:546-60	not an intervention, OECD

Bibliographic Information	Exclusion Reason
V. Allom, B. Mullan and J. Sebastian. Closing the intention-behaviour gap for sunscreen use and sun protection behaviours. Psychology & Health. 2013. 28:477-94	Not focused on risk communication
M. Suppa, S. Cazzaniga, M. C. Fargnoli, L. Naldi and K. Peris. Knowledge, perceptions and behaviours about skin cancer and sun protection among secondary school students from Central Italy. Journal of the European Academy of Dermatology & Venereology. 2013. 27:571-9	Not an intervention, OECD
S. A. Duffy, D. L. Ronis, A. H. Waltje and S. H. Choi. Protocol of a randomized controlled trial of sun protection interventions for operating engineers. BMC Public Health. 2013. 13:273	Protocol for a study only; no results
S. M. Campbell, Q. Louie-Gao, M. L. Hession, E. Bailey, A. C. Geller and D. Cummins. Skin cancer education among massage therapists: a survey at the 2010 meeting of the American Massage Therapy Association. Journal of Cancer Education. 2013. 28:158-64	melanoma identification
B. Bonevski, J. Bryant, S. Lambert, I. Brozek and V. Rock. The ABC of vitamin D: a qualitative study of the knowledge and attitudes regarding vitamin D deficiency amongst selected population groups. Nutrients. 2013. 5:915-27	not an intervention, OECD
A. J. Blashill. Psychosocial correlates of frequent indoor tanning among adolescent boys. Body Image. 2013. 10:259-62	Not focused on risk communication
K. N. Petty, C. R. Knee and A. K. Joseph. Sunscreen use among recreational cyclists: how intentions predict reported behavior. Journal of Health Psychology. 2013. 18:439-47	Not focused on risk communication
C. Mills, M. Knuiman, M. Rosenberg, L. Wood and R. Ferguson. Are the arts an effective setting for promoting health messages?. Perspectives in Public Health. 2013. 133:116-21	not very concrete intervention and it is really the sponsorship aspect being investigated â€“ so I suggest exclude
S. Schneider, K. Diehl, C. Bock, M. Schluter, E. W. Breitbart, B. Volkmer and R. Greinert. Sunbed use, user characteristics, and motivations for tanning: results from the German population-based SUN-Study 2012. JAMA Dermatology. 2013. 149:43-9	German study of sunbed use and motivational reasons
M. Falk and C. D. Anderson. Influence of age, gender, educational level and self-estimation of skin type on sun exposure habits and readiness to increase sun protection. Cancer Epidemiology. 2013. 37:127-32	Questionnaire about sun exposure and readiness to increase sun protection. Not a UK barriers/facilitators study
A. Isvy, A. Beauchet, P. Saiag and E. Mahe. Medical students and sun prevention: knowledge and behaviours in France. Journal of the European Academy of Dermatology & Venereology. 2013. 27:e247-51	Sun protection questionnaire in French medical students
C. Roman, A. Lugo-Somolinos and N. Thomas. Skin cancer knowledge and skin self-examinations in the Hispanic population of North Carolina: the patient's perspective. JAMA Dermatology. 2013. 149:103-4	Not focused on risk communication
E. J. Coups, J. L. Stapleton, S. V. Hudson, A. Medina-Forrester, A. Natale-Pereira and J. S. Goydos. Sun protection and exposure behaviors among Hispanic adults in the United States: differences according to acculturation and among Hispanic subgroups. BMC Public Health. 2012. 12:985	Not focused on risk communication
B. A. Glenn, R. Bastani, L. C. Chang, R. Khanna and K. Chen. Sun protection practices among children with a family history of melanoma: a pilot study. Journal of Cancer Education. 2012. 27:731-7	Not focused on risk communication

Bibliographic Information	Exclusion Reason
B. Ladizinski, R. Ladizinski and K. C. Lee. MTV's Jersey Shore and the "GTL" mantra: time to lose the "Tanning". Journal of the American Academy of Dermatology. 2012. 67:1380-2	Not focused on risk communication
J. Adams, E. L. Giles, S. Robalino, E. McColl and F. F. Sniehotta. A systematic review of the use of financial incentives and penalties to encourage uptake of healthy behaviors: protocol. Systems Review. 2012. 1:51	Protocol only
C. Y. Pourciau, M. J. Eide, M. Mahan and H. W. Lim. Photoprotection counseling of non-white ethno-racial groups: a survey of the practice of expert dermatologists. Photodermatology, Photoimmunology & Photomedicine. 2012. 28:335-7	No patient outcomes, only dermatologists' reports of advice given
A. Wysong, H. Gladstone, D. Kim, B. Lingala, J. Copeland and J. Y. Tang. Sunscreen use in NCAA collegiate athletes: identifying targets for intervention and barriers to use. Preventive Medicine. 2012. 55:493-6	no intervention, OECD
E. Lynch. Thinking outside the box. Nursing Standard. 2012. 27:23	Not SR/RCT
R. Estrada, G. Chavez-Lopez, G. Estrada-Chavez and S. Paredes-Solis. Specialized dermatological care for marginalized populations and education at the primary care level: is community dermatology a feasible proposal?. International Journal of Dermatology. 2012. 51:1345-50	Not impact of sunlight intervention
K. D. Reynolds, D. B. Buller, S. A. French, M. K. Buller and J. L. Ashley. School sun-protection policies: measure development and assessments in 2 regions of the United States. Journal of School Health. 2012. 82:499-507	No patient outcomes, only content of school policies
R. Branstrom, N. A. Kasparian, P. Affleck, A. Tibben, Y. M. Chang, E. Azizi, O. Baron-Epel, W. Bergman, M. Chan, J. Davies, C. Ingvar, P. A. Kanetsky, E. van Leeuwen, H. Olsson, N. A. Gruis, Y. Brandberg and J. Newton-Bishop. Perceptions of genetic research and testing among members of families with an increased risk of malignant melanoma. European Journal of Cancer. 2012. 48:3052-62	No intervention and a majority of participants had melanoma
H. de Vries, L. van Osch, K. Eijmael, C. Smerecnik and M. Candel. The role of risk perception in explaining parental sunscreen use. Psychology & Health. 2012. 27:1342-58	Risk perception study conducted in the Netherlands
C. E. Thomson, K. M. White and K. Hamilton. Investigating mothers' decisions about their child's sun-protective behaviour using the Theory of Planned Behaviour. Journal of Health Psychology. 2012. 17:1001-10	Not focused on risk communication
M. Garcia-Toro, O. Ibarra, M. Gili, M. J. Serrano, M. Vives, S. Monzon, N. Bauza, B. Olivan, E. Vicens and M. Roca. Adherence to lifestyle recommendations by patients with depression. Revista de Psiquiatria y Salud Mental. 2012. 5:236-40	Study is about sunlight exposure for non-seasonal depression. Not a population of interest
A. I. Reeder, J. A. Jopson and A. R. Gray. "Prescribing sunshine": a national, cross-sectional survey of 1,089 New Zealand general practitioners regarding their sun exposure and vitamin D perceptions, and advice provided to patients. BMC Family Practice. 2012. 13:85	No patient outcomes
V. Cokkinides, D. Kirkland, K. Andrews, K. Sullivan and J. L. Lichtenfeld. A profile of skin cancer prevention media coverage in 2009. Journal of the American Academy of Dermatology. 2012. 67:570-5	content analysis of media stories

Bibliographic Information	Exclusion Reason
K. Hamilton, K. M. White, D. Y. R. Mc, A. L. Hawkes, L. C. Starfelt and S. Leske. Identifying critical sun-protective beliefs among Australian adults. Health Education Research. 2012. 27:834-43	Not focused on risk communication
A. I. Reeder, J. A. Jopson and A. Gray. Primary school sun protection policies and practices 4 years after baseline--a follow-up study. Health Education Research. 2012. 27:844-56	School policies, not patient outcomes
M. Dean. "Many issues and beliefs affect individual sun safety advice". Nursing Times. 2012. 108:11	Editorial
C. Hernandez, D. Calero, G. Robinson, R. Mermelstein and J. K. Robinson. Comparison of sunscreen availability in Chicago Hispanic and non-Hispanic neighborhoods. Photodermatology, Photoimmunology & Photomedicine. 2012. 28:244-9	Not focused on risk communication
S. A. Oliveria, M. K. Heneghan, A. C. Halpern, J. L. Hay and A. C. Geller. Communication about family members' risk of melanoma: self-reported practices of dermatologists in the United States. Archives of Dermatology. 2012. 148:621-7	Barriers/facilitators non-UK
A. D. Tran, J. Aalborg, N. L. Asdigian, J. G. Morelli, S. T. Mokrohisky, R. P. Dellavalle, M. Berwick, N. F. Box and L. A. Crane. Parents' perceptions of skin cancer threat and children's physical activity. Preventing Chronic Disease. 2012. 9:E143	Cross sectional study from Colorado explore relationships between parental perceptions of skin cancer threat, sun protection behaviors, physical activity, and body mass index (BMI) in children.
L. G. Gordon, N. G. Hirst, A. C. Green and R. E. Neale. Tanning behaviors and determinants of solarium use among indoor office workers in Queensland, Australia. Journal of Health Psychology. 2012. 17:856-65	Cross sectional survey about prevalence and factors associated with indoor tanning in Brisbane office workers
E. de Vries, M. Arnold, E. Altsitsiadis, M. Trakatelli, B. Hinrichs, E. Stockfleth, J. Coebergh and E. Group. Potential impact of interventions resulting in reduced exposure to ultraviolet (UV) radiation (UVA and UVB) on skin cancer incidence in four European countries, 2010-2050. British Journal of Dermatology. 2012. 167 Suppl 2:53-62	Model of future skin cancer burden, not effect of interventions
E. Altsitsiadis, T. Undheim, E. de Vries, B. Hinrichs, E. Stockfleth, M. Trakatelli and E. Group. Health literacy, sunscreen and sunbed use: an uneasy association. British Journal of Dermatology. 2012. 167 Suppl 2:14-21	Not focused on risk communication
S. A. Duffy, S. H. Choi, R. Hollern and D. L. Ronis. Factors associated with risky sun exposure behaviors among operating engineers. American Journal of Industrial Medicine. 2012. 55:786-92	Not focused on risk communication
M. M. Gillen and C. N. Markey. The role of body image and depression in tanning behaviors and attitudes. Behavioral Medicine. 2012. 38:74-82	Not focused on risk communication
V. Siegel. Adding patient education of skin cancer and sun-protective behaviors to the skin assessment screening on admission to hospitals. MEDSURG Nursing. 2012. 21:183-4	No patient outcomes
A. Neenan, C. S. Lea and E. B. Lesesky. Reasons for tanning bed use: a survey of community college students in North Carolina. North Carolina Medical Journal. 2012. 73:89-92	Not focused on risk communication
B. H. Kim, K. Glanz and E. J. Nehl. Vitamin D beliefs and associations with sunburns, sun exposure, and sun protection. International Journal of Environmental Research & Public Health [Electronic Resource]. 2012. 9:2386-95	Not focused on risk communication

Bibliographic Information	Exclusion Reason
E. Yurtseven, T. Ulus, S. Vehid, S. Koksal, M. Bosat and K. Akkoyun. Assessment of knowledge, behaviour and sun protection practices among health services vocational school students. International Journal of Environmental Research & Public Health [Electronic Resource]. 2012. 9:2378-85	Not focused on risk communication
S. Allinson, M. Asmuss, C. Baldermann, J. Bentzen, D. Buller, N. Gerber, A. C. Green, R. Greinert, M. Kimlin, J. Kunrath, R. Matthes, C. Polzl-Viol, E. Rehfuess, C. Rossmann, N. Schuz, C. Sinclair, E. Deventer, A. Webb, W. Weiss and G. Ziegelberger. Validity and use of the UV index: report from the UVI working group, Schloss Hohenkammer, Germany, 5-7 December 2011. Health Physics. 2012. 103:301-6	No patient outcomes
S. Mair, H. P. Soyer, P. Youl, C. Hurst, A. Marshall and M. Janda. Personalised electronic messages to improve sun protection in young adults. Journal of Telemedicine & Telecare. 2012. 18:247-52	Recall of sun protection advice but not a specific intervention
D. B. Buller, B. J. Walkosz, P. A. Andersen, M. D. Scott, M. B. Dignan, G. R. Cutter, X. Zhang and I. L. Kane. Sustainability of the dissemination of an occupational sun protection program in a randomized trial. Health Education & Behavior. 2012. 39:498-502	Dissemination of an intervention, not patient outcomes
C. J. Heckman, S. Darlow, J. Cohen-Filipic, J. D. Kloss, S. L. Manne, T. Munshi and C. S. Perlis. Psychosocial correlates of sunburn among young adult women. International Journal of Environmental Research & Public Health [Electronic Resource]. 2012. 9:2241-51	Not focused on risk communication
S. A. Devos, J. D. Van der Endt, W. Broeckx, M. Vandaele, V. del Marmol, D. Roseeuw and T. Maselis. Sunscreen use and skin protection behaviour on the Belgian beach: a comparison 9 years later. European Journal of Cancer Prevention. 2012. 21:474-7	The study looks at the prevalence and predictors of sun smart behaviour over time in Belgium
D. Buchbinder, A. C. Mertens, L. K. Zeltzer, W. Leisenring, P. Goodman, E. A. Lown, M. A. Alderfer, C. Recklitis, K. Oeffinger, G. T. Armstrong, M. Hudson, L. L. Robison and J. Casillas. Cancer prevention and screening practices of siblings of childhood cancer survivors: a report from the Childhood Cancer Survivor Study. Cancer Epidemiology, Biomarkers & Prevention. 2012. 21:1078-88	Not focused on risk communication
C. Craciun, N. Schuz, S. Lippke and R. Schwarzer. Translating intentions into sunscreen use: an interaction of self-efficacy and appearance norms. Psychology Health & Medicine. 2012. 17:447-56	Not focused on risk communication
M. L. Greaney, E. Puleo, A. C. Geller, S. W. Hu, A. E. Werchniak, S. DeCristofaro, K. M. Emmons. Patient follow-up after participating in a beach-based skin cancer screening program. International Journal of Environmental Research & Public Health [Electronic Resource]. 2012. 9:1836-45	melanoma screening
D. B. Buller, P. A. Andersen, B. J. Walkosz, M. D. Scott, G. R. Cutter, M. B. Dignan, I. L. Kane, X. Zhang. Enhancing industry-based dissemination of an occupational sun protection program with theory-based strategies employing personal contact. American Journal of Health Promotion. 2012. 26:356-65	North America study; dissemination of intervention but no patient outcomes

Bibliographic Information	Exclusion Reason
S. Lawler, L. McDermott, D. O'Riordan, K. Spathonis, E. Eakin, E. Leslie, C. Gallois, N. Berndt, N. Owen. Relationships of sun-protection habit strength with sunscreen use during outdoor sport and physical activity. International Journal of Environmental Research & Public Health [Electronic Resource]. 2012. 9:916-23	Not focused on risk communication; Australia, no intervention
A. I. Tschetter, J. C. Lindemann. The many languages of skin health. South Dakota Medicine: The Journal of the South Dakota State Medical Association. 2012. 65:177-9, 181, 183	Study investigating several types of educational posters in the US
N. Abda, K. El Rhazi, M. Obtel, K. Bendahhou, A. Zidouh, M. Bennani, R. Bekkali, C. Nejjari. Determinants of self-reported sun protection practices among Moroccan population. Preventive Medicine. 2012. 54:422-4	Not focused on risk communication; non-UK, no intervention
E. Janssen, L. van Osch, L. Lechner, M. Candel, H. de Vries. Thinking versus feeling: differentiating between cognitive and affective components of perceived cancer risk. Psychology & Health. 2012. 27:767-83	Not focused on risk communication; non-UK, no intervention
E. Shuk, J. E. Burkhalter, C. F. Baguer, S. M. Holland, A. Pinkhasik, M. S. Brady, D. G. Coit, C. E. Ariyan, J. L. Hay. Factors associated with inconsistent sun protection in first-degree relatives of melanoma survivors. Qualitative Health Research. 2012. 22:934-45	Study about sun protection in melanoma first degree relatives from the US
J. E. McWhirter, L. Hoffman-Goetz. Visual images for skin cancer prevention: a systematic review of qualitative studies. Journal of Cancer Education. 2012. 27:202-16	Review investigates images in advertising - no data about how this impacts on readers
C. J. Heckman, J. Cohen-Filipic. Brief report: ultraviolet radiation exposure, considering acculturation among Hispanics (project URECAH). Journal of Cancer Education. 2012. 27:342-6	Study investigates skin cancer prevention attitudes and behaviours in accutured Hispanics
S. Dobbinson, M. Wakefield, D. Hill, A. Girgis, J. F. Aitken, K. Beckmann, A. I. Reeder, N. Herd, M. J. Spittal, A. Fairthorne, K. A. Bowles. Children's sun exposure and sun protection: prevalence in Australia and related parental factors. Journal of the American Academy of Dermatology. 2012. 66:938-47	Study investigates prevalence of children's sun-related behaviors and associated parental and other factors in Australian and NZ children
Control Centers for Disease, Prevention. Use of indoor tanning devices by adults--United States, 2010. MMWR - Morbidity & Mortality Weekly Report. 2012. 61:323-6	Not focused on risk communication; non-UK, no intervention
Control Centers for Disease, Prevention. Sunburn and sun protective behaviors among adults aged 18-29 years--United States, 2000-2010. MMWR - Morbidity & Mortality Weekly Report. 2012. 61:317-22	Study investigates evaluate trends in sunburn and sun protective behaviors in the US
A. L. Paiva, J. O. Prochaska, H. Q. Yin, J. S. Rossi, C. A. Redding, B. Blissmer, M. L. Robbins, W. F. Velicer, J. Lipschitz, N. Amoyal, S. F. Babbin, C. L. Blaney, M. A. Sillice, A. Fernandez, H. McGee, S. Horiuchi. Treated individuals who progress to action or maintenance for one behavior are more likely to make similar progress on another behavior: coaction results of a pooled data analysis of three trials. Preventive Medicine. 2012. 54:331-4	This study explores taking action in more than one healthy lifestyle choice at once. Not representative of the general population
H. de Vries, M. Logister, G. Krekels, F. Klaasse, V. Servranckx, L. van Osch. Internet based computer tailored feedback on sunscreen use. Journal of Medical Internet Research. 2012. 14:e48	Cross sectional Dutch study investigating perceptions concerning sunscreen

Bibliographic Information	Exclusion Reason
K. Lostritto, L. M. Ferrucci, B. Cartmel, D. J. Leffell, A. M. Molinaro, A. E. Bale, S. T. Mayne. Lifetime history of indoor tanning in young people: a retrospective assessment of initiation, persistence, and correlates. BMC Public Health. 2012. 12:118	Study collects retrospective information on lifetime history of indoor tanning in the US
J. Weiss, R. S. Kirsner, S. Hu. Trends in primary skin cancer prevention among US Hispanics: a systematic review. Journal of Drugs in Dermatology: JDD. 2012. 11:580-6	Study aimed to evaluate trends in skin cancer prevention efforts among Hispanics in the US
K. J. Buster, Z. You, M. Fouad, C. Elmets. Skin cancer risk perceptions: a comparison across ethnicity, age, education, gender, and income. Journal of the American Academy of Dermatology. 2012. 66:771-9	Not focused on risk communication; non-UK, no intervention
R. E. Sahn, M. J. McIlwain, K. H. Magee, E. Veledar, S. C. Chen. A cross-sectional study examining the correlation between sunless tanning product use and tanning beliefs and behaviors. Archives of Dermatology. 2012. 148:448-54	Not focused on risk communication; non-UK, no intervention
M. F. Holick, N. C. Binkley, H. A. Bischoff-Ferrari, C. M. Gordon, D. A. Hanley, R. P. Heaney, M. H. Murad, C. M. Weaver. Guidelines for preventing and treating vitamin D deficiency and insufficiency revisited. Journal of Clinical Endocrinology & Metabolism. 2012. 97:1153-8	Commentary not primary study
L. Dupont, D. N. Pereira. Sun exposure and sun protection habits in high school students from a city south of the country. Anais Brasileiros de Dermatologia. 2012. 87:90-5	Not focused on risk communication; non-UK, no intervention
M. Santiago-Rivas, W. F. Velicer, C. A. Redding, J. O. Prochaska, A. L. Paiva. Cluster subtypes within the precontemplation stage of change for sun protection behavior. Psychology Health & Medicine. 2012. 17:311-22	Not focused on risk communication; non-UK, no intervention
J. Li, W. Uter, A. Pfahlberg, O. Gefeller. A comparison of patterns of sun protection during beach holidays and everyday outdoor activities in a population sample of young German children. British Journal of Dermatology. 2012. 166:803-10	Not focused on risk communication; non-UK, no intervention
C. H. Basch, G. C. Hillyer, C. E. Basch, A. I. Neugut. Improving understanding about tanning behaviors in college students: a pilot study. Journal of American College Health. 2012. 60:250-6	Not focused on risk communication; non-UK, no intervention
D. Reinau, C. Meier, N. Gerber, G. F. Hofbauer, C. Surber. Sun protective behaviour of primary and secondary school students in North-Western Switzerland. Swiss Medical Weekly. 2012. 142:w13520	indirect evaluation of national campaigns
B. Bonevski, A. Girgis, P. Magin, G. Horton, I. Brozek, B. Armstrong. Prescribing sunshine: a cross-sectional survey of 500 Australian general practitioners' practices and attitudes about vitamin D. International Journal of Cancer. 2012. 130:2138-45	Not focused on risk communication; Australia; no patient outcomes
S. Durvasula, P. N. Sambrook, I. D. Cameron. Factors influencing adherence with therapeutic sunlight exposure in older people in intermediate care facilities. Archives of Gerontology & Geriatrics. 2012. 54:e234-41	Intervention is sun exposure (falls prevention) but not communication of risk; none of the listed outcomes; Australia
A. I. Reeder, J. A. Jopson, A. Gray. Sun protection policies and practices in New Zealand primary schools. New Zealand Medical Journal. 2012. 125:70-82	Intervention for school policies not risk communication; no patient outcomes; New Zealand
J. Miyamoto, Z. Berkowitz, S. E. Jones, M. Saraiya. Indoor tanning device use among male high school students in the United States. Journal of Adolescent Health. 2012. 50:308-10	Not focused on risk communication; non-UK, no intervention

Bibliographic Information	Exclusion Reason
C. Craciun, N. Schuz, S. Lippke, R. Schwarzer. A mediator model of sunscreen use: a longitudinal analysis of social-cognitive predictors and mediators. International Journal of Behavioral Medicine. 2012. 19:65-72	Not focused on risk communication; non-UK, no intervention
J. Hay, K. A. Kaphingst, R. Baser, Y. Li, S. Hensley-Alford, C. M. McBride. Skin cancer concerns and genetic risk information-seeking in primary care. Public Health Genomics. 2012. 15:57-72	Not focused on risk communication; non-UK, no outcomes of interventions
M. Williams, S. C. Jones, P. Caputi, D. Iverson. Australian adolescents' compliance with sun protection behaviours during summer: the importance of the school context. Health Promotion International. 2012. 27:15-22	Not focused on risk communication; non-UK, no intervention
S. W. Dusza, A. C. Halpern, J. M. Satagopan, S. A. Oliveria, M. A. Weinstock, A. Scope, M. Berwick, A. C. Geller. Prospective study of sunburn and sun behavior patterns during adolescence. Pediatrics. 2012. 129:309-17	Not focused on risk communication; non-UK, no intervention
A. L. Hawkes, K. Hamilton, K. M. White, D. Young R. Mc. A randomised controlled trial of a theory-based intervention to improve sun protective behaviour in adolescents ('you can still be HOT in the shade'): study protocol. BMC Cancer. 2012. 12:1	Study protocol only, no results
A. Katz, A. Lambert-Lanning, A. Miller, B. Kaminsky, J. Enns. Delivery of preventive care: the national Canadian Family Physician Cancer and Chronic Disease Prevention Survey. Canadian Family Physician. 2012. 58:e62-9	Barriers/facilitators but not UK
T. Aspden, D. K. Ingledew, J. A. Parkinson. Motives and health-related behaviour: incremental prediction by implicit motives. Psychology & Health. 2012. 27:51-71	Not focused on risk communication; no external influence or intervention described
D. B. Buller, P. A. Andersen, B. J. Walkosz, M. D. Scott, J. A. Maloy, M. B. Dignan, G. R. Cutter. Compliance with sunscreen advice in a survey of adults engaged in outdoor winter recreation at high-elevation ski areas. Journal of the American Academy of Dermatology. 2012. 66:63-70	not evaluating an intervention, this is a pre-intervention survey, OECD
E. Linos, E. Keiser, M. Kanzler, K. L. Sainani, W. Lee, E. Vittinghoff, M. M. Chren, J. Y. Tang. Sun protective behaviors and vitamin D levels in the US population: NHANES 2003-2006. Cancer Causes & Control. 2012. 23:133-40	Not focused on risk communication; non-UK no intervention
A. Friedland, T. Bianchetta, D. Elliott. Back to school: using physicians to teach middle school health. Delaware Medical Journal. 2011. 83:277-82	Non-UK barriers and facilitators
S. Kalia, D. McLean. Community programs in reducing ultraviolet radiation exposure. Journal of Cutaneous Medicine & Surgery. 2011. 15 Suppl 1:S387-91	This is a non-systematice review
C. J. Heckman, S. L. Manne, J. D. Kloss, S. B. Bass, B. Collins, S. R. Lessin. Beliefs and intentions for skin protection and UV exposure in young adults. American Journal of Health Behavior. 2011. 35:699-711	Not focused on risk communication; non-UK, no intervention
J. E. Munoz Negro, A. Buendia-Eisman, A. Cabrera Leon, S. Serrano Ortega. Variables associated with sun protection behaviour of preschoolers. European Journal of Dermatology. 2011. 21:985-90	not a SR or primary study
M. Kuhrik, C. Seckman, N. Kuhrik, T. Ahearn, P. Ercole. Bringing skin assessments to life using human patient simulation: an emphasis on cancer prevention and early detection. Journal of Cancer Education. 2011. 26:687-93	melanoma assessment, minor information on sun protective behaviour
M. B. Planta. Sunscreen and melanoma: is our prevention message correct?. Journal of the American Board of Family Medicine: JABFM. 2011. 24:735-9	non-systematic review

Bibliographic Information	Exclusion Reason
H. S. Gillespie, T. Watson, J. D. Emery, A. J. Lee, P. Murchie. A questionnaire to measure melanoma risk, knowledge and protective behaviour: assessing content validity in a convenience sample of Scots and Australians. BMC Medical Research Methodology. 2011. 11:123	Not focused on risk communication; not barriers/facilitators or intervention
M. Williams, P. Caputi, S. C. Jones, D. Iverson. Sun protecting and sun exposing behaviors: testing their relationship simultaneously with indicators of ultraviolet exposure among adolescents. Photochemistry & Photobiology. 2011. 87:1179-83	Study aimed to to assess speciï¬• c sun protecting and sun exposing behaviors in Australian adolescents
A. Boynton, M. Oxlad. Melanoma and its relationship with solarium use: health knowledge, attitudes and behaviour of young women. Journal of Health Psychology. 2011. 16:969-79	Study investigates knowledge, attitudes and behaviour towards solarium use among young Australian women
C. L. Paul, L. Paras, A. Harper, K. Coppa. Harm minimization in tan seekers: an exploration of tanning behaviour and the potential for substitutional use of sunless tanning products. Journal of Health Psychology. 2011. 16:929-37	Not focused on risk communication; non-UK, no patietn outcomes of intervention
T. Hotta. Understanding the risks and prevention of skin cancer. Plastic Surgical Nursing. 2011. 31:129-31	No outcomes of risk communication intervention
E. Mahe, A. Beauchet, M. F. de Maleissye, P. Saiag. Are sunscreens luxury products?. Journal of the American Academy of Dermatology. 2011. 65:e73-9	Study investigates the cost of sunscreen use in two different scenarios in France
S. L. Clipp, A. Burke, J. Hoffman-Bolton, R. Alani, N. J. Liegeois, A. J. Alberg. Sun-seeking behavior to increase cutaneous vitamin D synthesis: when prevention messages conflict. Public Health Reports. 2011. 126:533-9	Study describes the prevalence of (1) awareness of unprotected sun exposure to increase vitamin D and (2) the extent to which concerns about vitamin D may be influencing sun exposure in the US
J. K. Robinson, M. Bigby. Prevention of melanoma with regular sunscreen use. JAMA. 2011. 306:302-3	Commentary not primary study
V. A. Andreeva, M. G. Cockburn, A. L. Yaroch, J. B. Unger, R. Rueda, K. D. Reynolds. Preliminary evidence for mediation of the association between acculturation and sun-safe behaviors. Archives of Dermatology. 2011. 147:814-9	US study about the effect of acculturation on use of sunscreen, shade, and sun-protective clothing
L. Rezai, C. Thorgaard, A. Philip. Influential factors for sun policy implementation in Danish kindergartens. Scandinavian Journal of Public Health. 2011. 39:479-83	Study investigates the factors that influence a decision to implement the sun policy in Danish kindergartens
L. M. Oliveira, N. Glauss, A. Palma. Habits related to sun exposure among physical education teachers working with water activities. Anais Brasileiros de Dermatologia. 2011. 86:445-50	Study invstigates sun-exposure habits among teachers of physical education (PE) who work with water activities in Brazil
C. H. Brouse, G. C. Hillyer, C. E. Basch, A. I. Neugut. Geography, facilities, and promotional strategies used to encourage indoor tanning in New York City. Journal of Community Health. 2011. 36:635-9	Study about indoor tanning facilities in New York
J. Li, W. Uter, A. Pfahlberg, O. Gefeller. Parental perspective on sun protection for young children in Bavaria. Photodermatology, Photoimmunology & Photomedicine. 2011. 27:196-202	Study about Parents' attitude, knowledge and behavior regarding sun protection in Erlangen
M. Falk. Differences in sun exposure habits between self-reported skin type and ultraviolet sensitivity measured by phototest. Photodermatology, Photoimmunology & Photomedicine. 2011. 27:190-5	Study investigates how self-estimated skin type, and actual UV sensitivity measured by phototest correlate with sun exposure and protection in Sweden

Bibliographic Information	Exclusion Reason
I. Prichard, M. Tiggemann. Appearance investment in Australian brides-to-be. Body Image. 2011. 8:282-6	Study investigates appearance concerns of 440 engaged women recruited from bridal websites across Australia
E. Linos, E. Keiser, T. Fu, G. Colditz, S. Chen, J. Y. Tang. Hat, shade, long sleeves, or sunscreen? Rethinking US sun protection messages based on their relative effectiveness. Cancer Causes & Control. 2011. 22:1067-71	Not focused on risk communication; non-UK, no intervention
P. Murchie, F. C. Iweuke. Comparing personal risk, melanoma knowledge and protective behaviour in people with and without melanoma: a postal survey to explore educational needs in northeast Scotland. Journal of Cancer Education. 2011. 26:341-7	Excluded population (people with previous skin cancer)
G. D. Karelas. Social marketing self-esteem: a socio-medical approach to high-risk and skin tone alteration activities. International Journal of Dermatology. 2011. 50:590-2	Not a primary study or systematic review
H. G. Dixon, C. D. Warne, M. L. Scully, M. A. Wakefield, S. J. Dobbinson. Does the portrayal of tanning in Australian women's magazines relate to real women's tanning beliefs and behavior?. Health Education & Behavior. 2011. 38:132-42	Non-UK, no intervention
M. A. Karlsson, C. F. Wahlgren, K. Wiklund, Y. Rodvall. Parental sun-protective regimens and prevalence of common melanocytic naevi among 7-year-old children in Sweden: changes over a 5-year period. British Journal of Dermatology. 2011. 164:830-7	no risk communication intervention, OECD
S. Cheng, X. Guan, M. Cao, Y. Liu, S. Zhai. Randomized trial of the impact of a sun safety program on volunteers in outdoor venues. Photodermatology, Photoimmunology & Photomedicine. 2011. 27:75-80	Intervention but not OECD country (China)
I. Galan, A. Rodriguez-Laso, L. Diez-Ganan, E. Camara. Prevalence and correlates of skin cancer risk behaviors in Madrid (Spain). Gaceta Sanitaria. 2011. 25:44-9	Not focused on risk communication; non-UK, no intervention
S. L. Manne, E. J. Coups, P. B. Jacobsen, M. Ming, C. J. Heckman, S. Lessin. Sun protection and sunbathing practices among at-risk family members of patients with melanoma. BMC Public Health. 2011. 11:122	pre-intervention data
N. C. Berndt, D. L. O'Riordan, E. Winkler, L. McDermott, K. Spathonis, N. Owen. Social cognitive correlates of young adult sport competitors' sunscreen use. Health Education & Behavior. 2011. 38:6-14	no intervention, OECD
J. K. Robinson, K. M. Joshi, S. Ortiz, R. V. Kundu. Melanoma knowledge, perception, and awareness in ethnic minorities in Chicago: recommendations regarding education. Psycho-Oncology. 2011. 20:313-20	Non-UK; no patient outcomes of an intervention
S. Cathcart, J. DeCoster, M. Northington, W. Cantrell, C. A. Elmets, B. E. Elewski. Interest in cosmetic improvement as a marker for tanning behavior: a survey of 1602 respondents. Journal of Cosmetic Dermatology. 2011. 10:3-10	Not focused on risk communication; non-UK, no intervention
S. E. Hill, K. M. Durante. Courtship, competition, and the pursuit of attractiveness: mating goals facilitate health-related risk taking and strategic risk suppression in women. Personality & Social Psychology Bulletin. 2011. 37:383-94	Non-UK, no intervention
G. A. Kemp, L. Eagle, J. Verne. Mass media barriers to social marketing interventions: the example of sun protection in the UK. Health Promotion International. 2011. 26:37-45	not a SR or a primary study

Bibliographic Information	Exclusion Reason
J. Hay, M. DiBonaventura, R. Baser, N. Press, J. Shoveller, D. Bowen. Personal attributions for melanoma risk in melanoma-affected patients and family members. Journal of Behavioral Medicine. 2011. 34:53-63	Not focused on risk communication; non-UK, no intervention
K. A. Ettridge, J. A. Bowden, J. M. Rayner, C. J. Wilson. The relationship between sun protection policy and associated practices in a national sample of early childhood services in Australia. Health Education Research. 2011. 26:53-62	description of sun protection policies in Australia
S. Potente, K. Coppa, A. Williams, R. Engels. Legally brown: using ethnographic methods to understand sun protection attitudes and behaviours among young Australians 'I didn't mean to get burnt--it just happened!'. Health Education Research. 2011. 26:39-52	no intervention, OECD
E. Janssen, L. van Osch, H. de Vries, L. Lechner. Measuring risk perceptions of skin cancer: reliability and validity of different operationalizations. British Journal of Health Psychology. 2011. 16:92-112	Not focused on risk communication, non-UK, no intervention
C. R. Harrington, T. C. Beswick, J. Leitenberger, A. Minhajuddin, H. T. Jacobe, B. Adinoff. Addictive-like behaviours to ultraviolet light among frequent indoor tanners. Clinical & Experimental Dermatology. 2011. 36:33-8	Non-UK, no intervention
M. Thomas, E. Rioual, H. Adamski, A. M. Roguedas, L. Misery, M. Michel, F. Chastel, J. L. Schmutz, F. Aubin, M. C. Marguery, N. Meyer. Physicians involved in the care of patients with high risk of skin cancer should be trained regarding sun protection measures: evidence from a cross sectional study. Journal of the European Academy of Dermatology & Venereology. 2011. 25:19-23	Non-UK, no intervention
E. P. Armstrong, C. Campbell, A. Van Allen, E. Vincent. Skin cancer knowledge and prevention counseling among Arizona pharmacists. Journal of Pharmacy Practice. 2010. 23:358-66	Non-UK, no intervention
K. D. Cassel. "Sun Safe Kids," implementing a low cost, school-based public policy to protect Hawaii's children from skin cancer risks. Hawaii Medical Journal. 2010. 69:274-7	Non-UK, no patient outcomes of intervention
K. Choi, D. Lazovich, B. Southwell, J. Forster, S. J. Rolnick, J. Jackson. Prevalence and characteristics of indoor tanning use among men and women in the United States. Archives of Dermatology. 2010. 146:1356-61	Not focused on risk communication; non-UK, no intervention
A. M. Forsea, I. Kovalyshyn, S. W. Dusza, A. C. Halpern. Skin cancer prevention educational resources: just a click away?. Dermatologic Surgery. 2010. 36:1962-7	Non-UK, no patient outcomes of interventions
P. A. Andersen, D. B. Buller, B. J. Walkosz, M. D. Scott, J. A. Maloy, G. R. Cutter, M. D. Dignan. Environmental cues to UV radiation and personal sun protection in outdoor winter recreation. Archives of Dermatology. 2010. 146:1241-7	Not focused on risk communication; non-UK, no intervention
L. C. Pichon, I. Corral, H. Landrine, J. A. Mayer, D. Adams-Simms. Perceived skin cancer risk and sunscreen use among African American adults. Journal of Health Psychology. 2010. 15:1181-9	Not focused on risk communication; non-UK, no intervention
V. Q. Chung, J. S. Gordon, E. Veledar, S. C. Chen. Hot or not--evaluating the effect of artificial tanning on the public's perception of attractiveness. Dermatologic Surgery. 2010. 36:1651-5	Not focused on risk communication; non-UK, no intervention

Bibliographic Information	Exclusion Reason
D. M. Hall, C. Escoffery, E. Nehl, K. Glanz. Spontaneous diffusion of an effective skin cancer prevention program through Web-based access to program materials. Preventing Chronic Disease. 2010. 7:A125	Barriers/facilitators but not UK
H. Cho, S. Lee, K. Wilson. Magazine exposure, tanned women stereotypes, and tanning attitudes. Body Image. 2010. 7:364-7	Non-UK, no intervention
S. Durvasula, C. Kok, P. N. Sambrook, R. G. Cumming, S. R. Lord, L. M. March, R. S. Mason, M. J. Seibel, J. M. Simpson, I. D. Cameron. Sunlight and health: attitudes of older people living in intermediate care facilities in southern Australia. Archives of Gerontology & Geriatrics. 2010. 51:e94-9	Non-UK, no intervention
M. Rosenberg, L. Wood. The power of policy to influence behaviour change: daylight saving and its effect on physical activity. Australian & New Zealand Journal of Public Health. 2010. 34:83-8	not primarily related to risk communication
J. N. Harris, J. Hay, A. Kuniyuki, M. M. Asgari, N. Press, D. J. Bowen. Using a family systems approach to investigate cancer risk communication within melanoma families. Psycho-Oncology. 2010. 19:1102-11	pre-intervention baseline data, OECD, high risk of cancer, Suntalk study
M. F. de Maleissye, A. Beauchet, P. Aegerter, P. Saiag, E. Mahe. Parents' attitudes related to melanocytic nevus count in children. European Journal of Cancer Prevention. 2010. 19:472-7	BaF review - Non UK
V. E. Cokkinides, P. Bandi, M. A. Weinstock, E. Ward. Use of sunless tanning products among US adolescents aged 11 to 18 years. Archives of Dermatology. 2010. 146:987-92	Not focused on risk communication; non-UK, no intervention
M. Pertl, D. Hevey, K. Thomas, A. Craig, S. N. Chuinneagain, L. Maher. Differential effects of self-efficacy and perceived control on intention to perform skin cancer-related health behaviours. Health Education Research. 2010. 25:769-79	Non-UK, no intervention
R. Branstrom, N. A. Kasparian, Y. M. Chang, P. Affleck, A. Tibben, L. G. Aspinwall, E. Azizi, O. Baron-Epel, L. Battistuzzi, W. Bergman, W. Bruno, M. Chan, F. Cuellar, T. Debniak, D. Pjanova, S. Ertmanski, A. Figl, M. Gonzalez, N. K. Hayward, M. Hocevar, P. A. Kanetsky, S. A. Leachman, O. Heisele, J. Palmer, B. Peric, S. Puig, D. Schadendorf, N. A. Gruis, J. Newton-Bishop, Y. Brandberg. Predictors of sun protection behaviors and severe sunburn in an international online study. Cancer Epidemiology, Biomarkers & Prevention. 2010. 19:2199-210	Not focused on risk communication; no barriers/facilitators or intervention
L. J. Pavey, P. Sparks. Autonomy and reactions to health-risk information. Psychology & Health. 2010. 25:885-72	no intervention
C. Craciun, N. Schuz, S. Lippke, R. Schwarzer. Risk perception moderates how intentions are translated into sunscreen use. Journal of Behavioral Medicine. 2010. 33:392-8	Not focused on risk communication; non-UK, no intervention
V. A. Andreeva, A. L. Yaroch, J. B. Unger, M. G. Cockburn, R. Rueda, K. D. Reynolds. Moderated mediation regarding the sun-safe behaviors of U.S. Latinos: advancing the theory and evidence for acculturation-focused research and interventions. Journal of Immigrant & Minority Health. 2010. 12:691-8	Not focused on risk communication; non-UK, no intervention
A. Zittermann. The estimated benefits of vitamin D for Germany. Molecular Nutrition & Food Research. 2010. 54:1164-71	Non-UK, no patient outcomes of interventions

Bibliographic Information	Exclusion Reason
L. H. Vu, J. C. van der Pols, D. C. Whiteman, M. G. Kimlin, R. E. Neale. Knowledge and attitudes about Vitamin D and impact on sun protection practices among urban office workers in Brisbane, Australia. Cancer Epidemiology, Biomarkers & Prevention. 2010. 19:1784-9	Non-UK, no intervention
B. Koster, C. Thorgaard, A. Philip, I. H. Clemmensen. Prevalence of sunburn and sun-related behaviour in the Danish population: a cross-sectional study. Scandinavian Journal of Public Health. 2010. 38:548-52	no intervention
C. E. Cheng, B. Irwin, D. Mauriello, L. Hemminger, A. Pappert, A. B. Kimball. Health disparities among different ethnic and racial middle and high school students in sun exposure beliefs and knowledge. Journal of Adolescent Health. 2010. 47:106-9	Not focused on risk communication; non-UK, no intervention
C. Horlitz. Patient education materials in uveal melanoma. Insight (American Society of Ophthalmic Registered Nurses). 2010. 35:6-9	Not a primary study
C. Horlitz. Patient education materials in uveal melanoma. Insight (American Society of Ophthalmic Registered Nurses). 2010. 35:6-9	Not patient outcomes after sun protection intervention
S. Hunter, K. J. Wells, P. B. Jacobsen, J. H. Lee, D. Boulware, K. Love-Jackson, R. Abdulla, R. G. Roetzheim. Assessment of elementary school students' sun protection behaviors. Pediatric Dermatology. 2010. 27:182-8	pre-intervention baseline data, OECD
J. Matusitz, G. M. Breen. Inoculation theory: a framework for the reduction of skin cancer. Journal of Evidence-Based Social Work. 2010. 7:219-34	Not primary research or systematic review
I. G. Castilho, M. A. Sousa, R. M. Leite. Photoexposure and risk factors for skin cancer: an evaluation of behaviors and knowledge among university students. Anais Brasileiros de Dermatologia. 2010. 85:173-8	Not UK or OECD country (Brazil)
S. S. Mazloomy Mahmoodabad, M. T. Noorbala, Z. Rahaee, M. Mohammadi. Knowledge, attitude and performance study of secondary school teachers of Yazd city regarding skin cancer. Journal of the European Academy of Dermatology & Venereology. 2010. 24:424-8	Not focused on risk communication; not UK or OECD country (Iran)
W. E. Zahnd, J. Goldfarb, S. L. Scaife, M. L. Francis. Rural-urban differences in behaviors to prevent skin cancer: an analysis of the Health Information National Trends Survey. Journal of the American Academy of Dermatology. 2010. 62:950-6	Not focused on risk communication; non-UK, no intervention
H. Cho, J. G. Hall, C. Kosmoski, R. L. Fox, T. Mastin. Tanning, skin cancer risk, and prevention: a content analysis of eight popular magazines that target female readers, 1997-2006. Health Communication. 2010. 25:1-10	Content of magazine articles over time; no patient outcomes
A. Gavin, C. Donnelly, A. Devlin, C. Devereux, G. O'Callaghan, G. McElwee, S. Gordon, T. Crossan, N. McMahon, P. Loan, S. Martin, L. McPeak, J. Caughey, A. H. O'Hagan. Public at risk: a survey of sunbed parlour operating practices in Northern Ireland. British Journal of Dermatology. 2010. 162:627-32	No patient outcomes
J. M. Goulart, S. Q. Wang. Knowledge, motivation, and behavior patterns of the general public towards sun protection. Photochemical & Photobiological Sciences. 2010. 9:432-8	Barriers/facilitators but not UK

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R. Branstrom, Y. M. Chang, N. Kasparian, P. Affleck, A. Tibben, L. G. Aspinwall, E. Azizi, O. Baron-Epel, L. Battistuzzi, W. Bruno, M. Chan, F. Cuellar, T. Debniak, D. Pjanova, S. Ertmanski, A. Figl, M. Gonzalez, N. K. Hayward, M. Hocevar, P. A. Kanetsky, S. L. Leaf, F. A. van Nieuwpoort, O. Heisele, J. Palmer, B. Peric, S. Puig, A. D. Ruffin, D. Schadendorf, N. A. Gruis, Y. Brandberg, J. Newton-Bishop. Melanoma risk factors, perceived threat and intentional tanning: an international online survey. European Journal of Cancer Prevention. 2010. 19:216-26	Not focused on risk communication; non-UK, no intervention
T. Aspden, D. K. Ingledew, J. A. Parkinson. Motives and health-related behaviours: an investigation of equipotentiality and equifinality. Journal of Health Psychology. 2010. 15:467-79	Not focused on risk communication; not intervention or barriers/facilitators
B. A. Rabin, R. E. Glasgow, J. F. Kerner, M. P. Klump, R. C. Brownson. Dissemination and implementation research on community-based cancer prevention: a systematic review. American Journal of Preventive Medicine. 2010. 38:443-56	Identifies and describes characteristics of primary studies only. No synthesis about sun protection reported
G. Burrish. Extenuating circumstances: indoor tanning: the preventable epidemic. South Dakota Medicine: The Journal of the South Dakota State Medical Association. 2010. 63:61	No intervention
P. R. von Hurst, W. Stonehouse, J. Coad. Vitamin D status and attitudes towards sun exposure in South Asian women living in Auckland, New Zealand. Public Health Nutrition. 2010. 13:531-6	Not focused on risk communication; non-UK, no intervention
P. Bandi, V. E. Cokkinides, M. A. Weinstock, E. Ward. Sunburns, sun protection and indoor tanning behaviors, and attitudes regarding sun protection benefits and tan appeal among parents of U.S. adolescents-1998 compared to 2004. Pediatric Dermatology. 2010. 27:9-18	Not focused on risk communication; non-UK, no intervention
S. Murnane. Vitamin D and women's health. Beginnings. 2010. 30:4-5	Intervention: 1st year medical school; not specifically designed to convey info about sun or UV;
T. Gambichler, M. Dissel, P. Altmeyer, S. Rotterdam. Evaluation of sun awareness with an emphasis on ultraviolet protection by clothing: a survey of adults in Western Germany. Journal of the European Academy of Dermatology & Venereology. 2010. 24:155-62	Not focused on risk communication; non-UK, no intervention
L. C. Pichon, I. Corral, H. Landrine, J. A. Mayer, G. J. Norman. Sun-protection behaviors among African Americans. American Journal of Preventive Medicine. 2010. 38:288-95	Not focused on risk communication; non-UK, no intervention
Y. E. Rodvall, C. F. Wahlgren, H. T. Ullen, K. E. Wiklund. Factors related to being sunburnt in 7-year-old children in Sweden. European Journal of Cancer. 2010. 46:566-72	not an intervention, OECD
R. J. Sage, H. W. Lim. Therapeutic Hotline: Recommendations on photoprotection and vitamin D. Dermatologic Therapy. 2010. 23:82-5	No patient outcomes
D. K. Ingledew, E. Ferguson, D. Markland. Motives and sun-related behaviour. Journal of Health Psychology. 2010. 15:8-20	Not focused on risk communication; not barriers/facilitators or interventions
H. W. Sullivan, L. J. Rutten, B. W. Hesse, R. P. Moser, A. J. Rothman, K. D. McCaul. Lay representations of cancer prevention and early detection: associations with prevention behaviors. Preventing Chronic Disease. 2010. 7:A14	Not focused on risk communication; non-UK, no intervention
D. Haluza, R. Cervinka. Perceived relevance of educative information on public (skin) health: a cross-sectional questionnaire survey. Journal of Preventive Medicine & Public Health / Yebang Uihakhoe Chi. 2013. 46:82-8	not a specific intervention, OECD

Bibliographic Information	Exclusion Reason
J. Brant, C. Arthur, S. Chaudhry, S. Jagwani, P. Ravanfar, S. Youker, S. W. Fosko, L. Cornelius, F. E. Johnson, S. Lickerman. A collaborative skin cancer educational program for adolescents. Missouri Medicine. 2009. 106:226-8	Description of intervention but no outcomes
G. C. Joel Hillhouse, J. K. Thompson, P. B. Jacobsen, J. Hillhouse. Investigating the role of appearance-based factors in predicting sunbathing and tanning salon use. Journal of Behavioral Medicine. 2009. 32:532-44	Non-UK, no intervention
J. J. Yoo. Peer influence on adolescent boys' appearance management behaviors. Adolescence. 2009. 44:1017-31	No intervention
P. K. Han, R. P. Moser, W. M. Klein, E. B. Beckjord, A. C. Dunlavy, B. W. Hesse. Predictors of perceived ambiguity about cancer prevention recommendations: sociodemographic factors and mass media exposures. Health Communication. 2009. 24:764-72	Barriers/facilitators but not UK
R. D. Borschmann, D. Cottrell. Developing the readiness to alter sun-protective behaviour questionnaire (RASP-B). Cancer Epidemiology. 2009. 33:451-62	Not focused on risk communication; questionnaire development
E. Bondurant, K. Hanson. Reducing skin cancer risks. Ncsl Legisbrief. 2009. 17:1-2	Not a systematic review
K. M. Johnson, S. C. Jones, D. Iverson. Guidelines for the development of social marketing programmes for sun protection among adolescents and young adults. Public Health. 2009. 123 Suppl 1:e6-10	Barriers/facilitators but not UK
J. P. McCool, A. I. Reeder, E. M. Robinson, K. J. Petrie, D. F. Gorman. Outdoor workers' perceptions of the risks of excess sun-exposure.[Erratum appears in J Occup Health. 2009;51(6):E2]. Journal of Occupational Health. 2009. 51:404-11	Non-UK, no intervention
L. J. Loescher, J. D. Crist, L. Cranmer, C. Curiel-Lewandrowski, J. A. Warneke. Melanoma high-risk families' perceived health care provider risk communication. Journal of Cancer Education. 2009. 24:301-7	majority were melanoma survivors
P. Autier. Sunscreen abuse for intentional sun exposure. British Journal of Dermatology. 2009. 161 Suppl 3:40-5	Non-UK, no intervention
N. A. Kasparian, J. K. McLoone, B. Meiser. Skin cancer-related prevention and screening behaviors: a review of the literature. Journal of Behavioral Medicine. 2009. 32:406-28	Systematic review but no eligible studies
A. I. Reeder, J. A. Jopson, A. Gray. Baseline survey of sun protection policies and practices in primary school settings in New Zealand. Health Education Research. 2009. 24:778-87	Presence of policies in schools but no patient outcomes
N. Stollery. Sun damage. Practitioner. 2009. 253:31-3	Not a systematic review
D. Hall, N. Dubruiel, T. Elliott, K. Glanz. Linking agents' activities and communication patterns in a study of the dissemination of an effective skin cancer prevention program. Journal of Public Health Management & Practice. 2009. 15:409-15	Intervention but no patient outcomes; non-UK
L. Hurd Clarke, A. Korotchenko. Older women and suntanning: the negotiation of health and appearance risks. Sociology of Health & Illness. 2009. 31:748-61	Non-UK, no intervention
E. Mahe, S. Qattini, A. Beauchet, P. Saiag. Web-based resources for sun protection information--a French-language evaluation. European Journal of Cancer. 2009. 45:2160-7	Non-UK; quality of websites but not patient outcomes
J. Arndt, C. R. Cox, J. L. Goldenberg, M. Vess, C. Routledge, D. P. Cooper, F. Cohen. Blowing in the (social) wind: implications of extrinsic esteem contingencies for terror management and health. Journal of Personality & Social Psychology. 2009. 96:1191-205	not a real world intervention

Bibliographic Information	Exclusion Reason
P. A. Andersen, D. B. Buller, B. J. Walkosz, J. Maloy, M. D. Scott, G. R. Cutter, M. B. Dignan. Testing a theory-based health communication program: a replication of Go Sun Smart in outdoor winter recreation. Journal of Health Communication. 2009. 14:346-65	skiing
K. P. Tercyak, A. A. Abraham, A. L. Graham, L. D. Wilson, L. R. Walker. Association of multiple behavioral risk factors with adolescents' willingness to engage in eHealth promotion. Journal of Pediatric Psychology. 2009. 34:457-69	No patient outcomes of intervention; non-UK
C. Escoffery, K. Glanz, D. Hall, T. Elliott. A multi-method process evaluation for a skin cancer prevention diffusion trial. Evaluation & the Health Professions. 2009. 32:184-203	describes the process of the PoolCool intervention, but not the results
L. Naldi, F. Sassi. Evaluation of patient education. Cancer Treatment & Research. 2009. 146:417-23	Non-systematic review
L. J. Loescher, J. D. Crist, L. A. Siaki. Perceived intrafamily melanoma risk communication. Cancer Nursing. 2009. 32:203-10	Non OECD
M. Kull, R. Kallikorm, M. Lember. Body mass index determines sunbathing habits: implications on vitamin D levels. Internal Medicine Journal. 2009. 39:256-8	Non-UK, no intervention
M. Hemmelgarn. Shedding light on vitamin D. American Journal of Nursing. 2009. 109:19-20	not a SR or primary study
C. Redeker, J. Wardle, D. Wilder, S. Hiom, A. Miles. The launch of Cancer Research UK's 'Reduce the Risk' campaign: baseline measurements of public awareness of cancer risk factors in 2004. European Journal of Cancer. 2009. 45:827-36	no intervention; baseline measurement of public awareness;
S. L. Pagoto, K. L. Schneider, J. Oleski, J. S. Bodenlos, P. Merriam, Y. Ma. Design and methods for a cluster randomized trial of the Sunless Study: a skin cancer prevention intervention promoting sunless tanning among beach visitors. BMC Public Health. 2009. 9:50	Design of a trial only; no outcomes
L. F. Rutten, B. W. Hesse, R. P. Moser, K. D. McCaul, A. J. Rothman. Public perceptions of cancer prevention, screening, and survival: comparison with state-of-science evidence for colon, skin, and lung cancer. Journal of Cancer Education. 2009. 24:40-8	Non-UK, no intervention
B. V. Nolan, S. R. Feldman. Ultraviolet tanning addiction. Dermatologic Clinics. 2009. 27:109-12, v	Non-systematic review
M. A. Adams, J. A. Mayer, D. J. Bowen and M. Ji. Season of interview and self-report of summer sun protection behaviors. Cancer Causes & Control. 2009. 20:153-62	Non-UK, no intervention
C. J. Heckman, D. B. Wilson and K. S. Ingersoll. The influence of appearance, health, and future orientations on tanning behavior. American Journal of Health Behavior. 2009. 33:238-43	Non-UK (USA), no intervention
A. Bakija-Konsuo and R. Mulic. Educating people about importance of photoprotection: results of campaign on the islands in Dubrovnik area. Collegium Antropologicum. 2008. 32 Suppl 2:189-93	Intervention but not OECD country (Croatia)
M. Scully, M. Wakefield and H. Dixon. Trends in news coverage about skin cancer prevention, 1993-2006: increasingly mixed messages for the public. Australian & New Zealand Journal of Public Health. 2008. 32:461-6	Content of newspaper articles; no patient outcomes
E. W. Hossler and M. P. Conroy. YouTube as a source of information on tanning bed use. Archives of Dermatology. 2008. 144:1395-6	Content of YouTube videos; no patient outcomes

Bibliographic Information	Exclusion Reason
S. B. Jones, K. Beckmann and J. Rayner. Australian primary schools' sun protection policy and practice: evaluating the impact of the National SunSmart Schools Program. Health Promotion Journal of Australia. 2008. 19:86-90	Intervention but outcomes are school policies not individual knowledge, attitudes or behaviour
N. Priest, R. Armstrong, J. Doyle and E. Waters. Policy interventions implemented through sporting organisations for promoting healthy behaviour change. Cochrane Database of Systematic Reviews. 2008. :CD004809	SR - no included studies; no outcome data
C. Escoffery, K. Glanz and T. Elliott. Process evaluation of the Pool Cool Diffusion Trial for skin cancer prevention across 2 years. Health Education Research. 2008. 23:732-43	process evaluation for PoolCool, no results, OECD
V. A. Andreeva, K. D. Reynolds, D. B. Buller, C. P. Chou and A. L. Yaroch. Concurrent psychosocial predictors of sun safety among middle school youth. Journal of School Health. 2008. 78:374-81; quiz 408-10	Non-UK, no intervention
N. Pakrou, R. Casson, S. Fung, N. Ferdowsi, G. Lee and D. Selva. South Australian adolescent ophthalmic sun protective behaviours.[Erratum appears in Eye. 2008 Jul;22(7):982]. Eye. 2008. 22:808-14	Non-UK, no intervention
H. M. Marshall, A. M. Reinhart, T. H. Feeley, F. Tutzauer and A. Anker. Comparing college students' value-, outcome-, and impression-relevant involvement in health-related issues. Health Communication. 2008. 23:171-83	Non-UK, no intervention
G. Cafri, J. K. Thompson, M. Roehrig, A. Rojas, S. Sperry, P. B. Jacobsen and J. Hillhouse. Appearance motives to tan and not tan: evidence for validity and reliability of a new scale. Annals of Behavioral Medicine. 2008. 35:209-20	Non-UK barriers and facilitators
R. Greinert, E. W. Breitbart, P. Mohar and B. Volkmer. Health initiatives for the prevention of skin cancer. Advances in Experimental Medicine & Biology. 2008. 624:125-36	Not systematic review or primary study
A. Emmett, T. Uchida and R. F. Wagner, Jr.. Sunburn risk factors for beachgoing children. Dermatology Online Journal. 2008. 14:28	No Intervention
K. A. Mallett, J. K. Robinson and R. Turrisi. Enhancing patient motivation to reduce UV risk behaviors: assessing the interest and willingness of dermatologists to try a different approach. Archives of Dermatology. 2008. 144:265-6	Non-UK, no intervention
S. P. Poorsattar and R. L. Hornung. Television turning more teens toward tanning?. Journal of the American Academy of Dermatology. 2008. 58:171-2	Non-UK, no intervention
R. A. Young, C. Logan, C. Y. Lovato, B. Moffat and J. A. Shoveller. Sun protection as a family health project in families with adolescents. Journal of Health Psychology. 2005. 10:333-44	Non-UK Barriers and facilitators
K. Diehl, C. Bock, E. W. Breitbart, R. Greinert and S. Schneider. Building awareness of the health risks of sunbed use: Identification of target groups for prevention. Photodermatology Photoimmunology and Photomedicine. 2013. 29:291-299	Non-UK, no intervention
M. Mitka. Survey finds physicians rarely advise use of sunscreen to patients, even those most at risk for skin cancer. JAMA - Journal of the American Medical Association. 2013. 310:1328	Editorial not primary study
T. E. Naquin. A systematic review of literature identifying young women's knowledge and exposure to tanning beds. Journal of the Dermatology Nurses' Association. 2013. 5:197-203	No outcomes of interest: Has pre existing knowledge, but not in intermediaries

Bibliographic Information	Exclusion Reason
S. N. Williams. A tax on indoor tanning would reduce demand in Europe. BMJ (Clinical research ed.). 2012. 345:	No patient outcomes
S. C. Banerjee, J. L. Hay and K. Greene. College students' cognitive rationalizations for tanning bed use: An exploratory study. Archives of Dermatology. 2012. 148:761-762	Non-UK, no intervention
A. M. Hartman, F. M. Perna, D. M. Holman, Z. Berkowitz, G. P. Guy, M. Saraiya and M. Plescia. Sunburn and sun protective behaviors among adults aged 18-29 years - United States, 2000-2010. Morbidity and Mortality Weekly Report. 2012. 61:317-322	non-UK, no intervention
J. E. Nanyes, J. M. McGrath and J. Krejci-Manwaring. Medical students' perceptions of skin cancer: Confusion and disregard for warnings and the need for new preventive strategies. Archives of Dermatology. 2012. 148:392-393	non-UK, no intervention
B. Adinoff. Should we be targeting potential addictive behaviors in tanning bed users?. Neuropsychiatry. 2012. 2:1-4	non-UK, no intervention
K. A. Mallett, R. Turrisi, K. Guttman, A. Read, E. Billingsley and J. Robinson. Assessing dermatologists' ability to deliver a novel intervention to improve patients'use of sun protection: The ABC method of physician-patient communication. Archives of Dermatology. 2011. 147:1451-1453	Intervention but no patient outcomes
M. K. Barton. Sunscreen use in adults is beneficial in preventing melanoma. CA: a cancer journal for clinicians. 2011. 61:137-138	Not primary study
A. L. Dawson, A. A. Hamstra, L. S. Huff, R. G. Gamble, W. Howe, I. Kane and R. P. Dellavalle. Online videos to promote sun safety: Results of a contest. Dermatology Reports. 2011. 3:	Intervention but no patient outcomes
A. R. Dominguez and A. G. Pandya. Need for more education for latinos regarding sun-safe behaviors. Archives of Dermatology. 2011. 147:820	This is a non-systematic review
P. D. Baade, A. C. Green, B. M. Smithers and J. F. Aitken. Trends in melanoma incidence among children: Possible influence of sun-protection programs. Expert Review of Anticancer Therapy. 2011. 11:661-664	Editorial
A. E. Macbeth, D. J. C. Grindlay and H. C. Williams. What's new in skin cancer? An analysis of guidelines and systematic reviews published in 2008-2009. Clinical and Experimental Dermatology. 2011. 36:453-458	Not intervention or barriers/facilitators
S. S. Patel, R. I. Nijhawan, S. Stechschulte, Y. Parmet, P. Rouhani, R. S. Kirsner and S. Hu. Skin cancer awareness, attitude, and sun protection behavior among medical students at the University of Miami Miller School of Medicine. Archives of Dermatology. 2010. 146:797-800	Non-UK, no intervention
J. M. Martin, J. M. Ghaferi, D. L. Cummins, A. J. Mamelak, C. D. Schmults, M. Parikh, L. A. Speyer, A. Chuang, H. V. Richardson, D. Stein and N. J. Liegeois. Changes in skin tanning attitudes. Fashion articles and advertisements in the early 20th century. American journal of public health. 2009. 99:2140-2146	Non-UK, no intervention, no patient outcomes
R. Tucker. Giving advice on sun safety: Part II. Pharmaceutical Journal. 2009. 282:419-422	Non-systematic review
A. A. McClung, T. Uchida and R. F. Wagner Jr. Body dysmorphic disorder and substance-related disorder among indoor tanners. Skin Cancer. 2008. 23:17-22	Not a UK barriers/facilitators study

Bibliographic Information	Exclusion Reason
T. Poonawalla, T. Uchida and R. F. Wagner Jr. Incorporating ethnicity into a high school sunburn prevention program. Skin Cancer. 2008. 23:9-16	Not a SR or RCT
S. Aquilina, L. Scerri, N. Calleja and A. Amato-Gauci. Trends in sun exposure awareness and protection practices in Malta: 1999-2004. Malta Medical Journal. 2008. 20:6-11	Non-UK, no intervention
V. Bataille and E. De Vries. Melanoma - Part 1: Epidemiology, risk factors, and prevention. Bmj. 2008. 337:1287-1291	Not intervention or barriers/facilitators; no patient outcomes
G. J. Hollands, M. Hankins, A. Van Den Heuvel and T. M. Marteau. Visual feedback of the individual's medical imaging results for changing health behaviours in clinical and non-clinical populations. Cochrane Database of Systematic Reviews. 2008. (4):	Protocol for SR only; no data/outcomes
C. M. Moriarty and J. E. Stryker. Prevention and screening efficacy messages in newspaper accounts of cancer. Health Education Research. 2008. 23:487-498	No patient outcomes
M. A. Weinstock. The Struggle for Primary Prevention of Skin Cancer. American Journal of Preventive Medicine. 2008. 34:171-172	Editorial/commentary
J. Hollands Gareth, D. Cameron Linda, A. Crockett Rachel and M. Marteau Theresa. Presentation of aversive visual images in health communication for changing health behaviour. . 2011. :	Protocol for a SR only; no data/outcomes
M. F. Maleissye, A. Beauchet, P. Saiag, M. Correa, S. Godin-Beeckmann, M. Haeffelin and E. Mahe. Sunscreen use and melanocytic nevi in children: a systematic review (Provisional abstract). . 2013. :51-59	No intervention
. Cancer reform strategy: achieving local implementation - second annual report. . 2009. :	cancer strategy but no patient outcomes
. Cancer reform strategy: maintaining momentum, building for the future - first annual report. . 2008. :	No patient outcomes
V. Araujo-Soares, A. Rodrigues, J. Presseau and F. Sniehotta. Adolescent sunscreen use in springtime: A prospective predictive study informed by a belief elicitation investigation. Journal of Behavioral Medicine. 2013. 36:109-123	Non-UK, no intervention
M. Santiago Rivas. Testing the mechanisms of change for sun protection behavior. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2013. 74:No Pagination Specified	Non-UK, no patient outcomes of interventions
N. Italia and E. A. Rehfuess. "Is the Global Solar UV Index an effective instrument for promoting sun protection? A systematic review": Corrigendum. Health Education Research. 2012. 27:1129-1131	This is a correction to a published study; original study might be eligible
N. Lewis. Priming effects of perceived norms on behavioral intention through observability. Journal of Applied Social Psychology. 2013. 43:E97-E108	Non-UK, no intervention
J. Spas. Multiple health behavior risks: Redefining co-action and investigating multiple health behavior change using the transtheoretical model. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2013. 73:No Pagination Specified	No outcomes of interest
K. M. Gallagher and J. A. Updegraff. Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. Annals of Behavioral Medicine. 2012. 43:101-116	Not focused on sunlight/UV exposure

Bibliographic Information	Exclusion Reason
R. Borschmann, K. Lines and D. Cottrell. Sun protective behaviour, optimism bias, and the transtheoretical model of behaviour change. Australian Journal of Psychology. 2012. 64:181-188	Non=UK, no intervention
J. Stone and N. Fernandez. When thinking about less failure causes more dissonance: The effect of elaboration and recall on behavior change following hypocrisy. Social Influence. 2011. 6:199-211	Non-UK, no intervention
J.-J. Yoo and H.-Y. Kim. Adolescents' body-tanning behaviours: Influences of gender, body mass index, sociocultural attitudes towards appearance and body satisfaction. International Journal of Consumer Studies. 2012. 36:360-366	Non-UK, no intervention
J. Kenway and E. Bullen. Skin pedagogies and abject bodies. Sport, Education and Society. 2011. 16:279-294	not a SR or primary study
A. R. W. Bequette. We can work it out: An examination of Terror Management Theory and Sociometer Theory in a health examination. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2011. 71:6486	Not a UK barriers and facilitators study
J. S. Fulmore. Development of an instrument to assess the predisposing factors of sun protection with adolescent athletes: An exploratory mixed methods study. Dissertation Abstracts International Section A: Humanities and Social Sciences. 2010. 71:99	Non-UK barriers and facilitators
A. Adams. The relationship among illness representations, risk representations, empathy, and preventive health behaviors. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2010. 70:5885	not an intervention study, a validation study
J. K. Robinson. Consider tanning motivations and counsel accordingly. JAMA: Journal of the American Medical Association. 2010. 303:2074-2075	Commentary
M. L. Stock, M. Gerrard, F. X. Gibbons, J. L. Dykstra, C.-Y. Weng, H. I. Mahler, L. A. Walsh and J. A. Kulik. Sun protection intervention for highway workers: Long-term efficacy of UV photography and skin cancer information on men's protective cognitions and behavior: Erratum. Annals of Behavioral Medicine. 2010. 39:100	This is only an erratum (original article should be included)
V. Siegel. Student nurse knowledge of skin cancer, sun protective behaviors, perceptions of acquiring skin cancer, and the role of the nurse in skin cancer prevention. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2009. 70:2839	non-UK barriers and facilitators
S. L. Leaf. Do the right thing: Anticipated affect as a guide to behavioral choice. Dissertation Abstracts International: Section B: The Sciences and Engineering. 2009. 69:7160	Non-UK barriers and facilitators
J. C. Mowen, A. Longoria and A. Sallee. Burning and cutting: Identifying the traits of individuals with an enduring propensity to tan and to undergo cosmetic surgery. Journal of Consumer Behaviour. 2009. 8:238-251	Not an SR or RCT
M. D. Scott, D. B. Buller, B. J. Walkosz, P. A. Andersen, G. R. Cutter and M. B. Dignan. Go Sun Smart. Communication Education. 2008. 57:423-433	Focused on skiers
L. Van Osch, A. Reubsaet, L. Lechner, M. Candel, L. Mercken and H. De Vries. Predicting parental sunscreen use: Disentangling the role of action planning in the intention-behavior relationship. Psychology & Health. 2008. 23:829-847	no intervention; survey of attitudes, knowledge and behaviour

Bibliographic Information	Exclusion Reason
S. Nhs, Scotl and G. Scottish. Prevention of ill health in older people: an economic analysis. . 2011. :	Not sunlight/UV intervention
I. Jenny and P. Barbara. The health needs of the Somali community in Bristol. Community Practitioner. 2009. 82:26-29 2009	No intervention
C. Scott, J. Hillhouse and R. Turrisi. Student Column evaluating a theoretical model of indoor tanning using structural equation modeling. Public Health Reports. 2014. 129:107-110	Non-UK, no intervention
A. J. Blashill and L. Traeger. Indoor Tanning Use Among Adolescent Males: The Role of Perceived Weight and Bullying. Annals of Behavioral Medicine. 2013. 46:232-236	Non-UK, no intervention
P. S. Worley. Knowledge and attitudes to sun exposure among adolescents in Korinthos, Greece (Retraction of vol 9, 1162, 2009). Rural and Remote Health. 2013. 13:	Non-UK, no intervention
O. Kiriaev, H. C. Wong, H. Astell, N. Whitehead, S. Paul and S. Sankaran. Vitamin D prescription, education interventions, and falls in south Auckland aged related residential care facilities. Australasian Journal on Ageing. 2012. 31:19-20	Abstract only
E. J. Coups, J. Stapleton, S. V. Hudson, A. Medina-Forrester, J. S. Goydos and A. Natale-Pereira. Sun Protection Behaviors and Skin Cancer Screening among Hispanic Adults. Annals of Behavioral Medicine. 2012. 43:S161-S161	no intervention; simple survey of attitudes and knowledge;
K. L. Schneider, S. L. Pagoto, E. Panza and D. Goldberg. Elevated Rates of Tanning Dependence and Skin Cancer Risk Behaviors in Physically Active Individuals. Annals of Behavioral Medicine. 2012. 43:S173-S173	conference abstract only
V. Allom and B. Mullan. Cognitive flexibility increases the predictive validity of the Theory of Planned Behaviour for sun-protection behaviours. Psychology & Health. 2012. 27:3-4	study published in abstract form only
K. Morris, A. Swinbourne and S. Harrison. Sun in the tropics: Attitudes surrounding incidental sun exposure in North Queensland. Psychology & Health. 2012. 27:281-281	Abstract only
K. White, K. Hamilton, R. Young, A. Hawkes, L. Starfelt and S. Leske. Identifying critical sun-protective beliefs among Australian adults. Psychology & Health. 2012. 27:350-350	no intervention; survey of attitudes and behaviours;
M. Stock, L. Walsh and L. Peterson. Sun Protection Reactions to Uv Photography among Younger Versus Older Women: Emotional Reactions Versus Cognitive Thinking. Annals of Behavioral Medicine. 2011. 41:S158-S158	conference abstract only;
R. Angela, A. S. Vera and S. Falko. Interventions promoting sun-protective behaviours: An analysis of effective behaviour change techniques and modes of delivery. Psychology & Health. 2011. 26:55-55	conference abstract only
W. Katherine, Y. Ross, L. Stuart and H. Anna. Psychosocial influences determining Australians' sun safe practices: Testing an extended theory of planned behaviour. Psychology & Health. 2011. 26:238-238	conference abstract only
S. Keeney, H. McKenna, P. Fleming and S. McIlfatrick. Attitudes to cancer and cancer prevention: what do people aged 35-54 years think?. European Journal of Cancer Care. 2010. 19:769-777	No intervention
C. Craciun, C. Mallach, S. Lippke and R. Schwarzer. Beyond intention: Risk perception moderates how intentions are translated into sunscreen use. Psychology & Health. 2010. 25:24-24	No intervention

Bibliographic Information	Exclusion Reason
D. B. Buller, P. Andersen, B. Walkosz, M. Scott, M. Dignan, G. Cutter, I. Kane and X. A. Zhang. Effective Strategies for Disseminating a Workplace Sun Safety Program. Annals of Behavioral Medicine. 2010. 39:60-60	Abstract only
N. B. Henrikson and D. Bowen. Socioeconomic Disparities in Sun Protection Behavior and Screening. Annals of Behavioral Medicine. 2010. 39:131-131	abstract only
M. Santiago-Rivas, W. F. Velicer, C. A. Redding, J. O. Prochaska and A. L. Paiva. Cluster Subtypes within the Precontemplation Stage of Change for Sun Protection Behavior. Annals of Behavioral Medicine. 2010. 39:167-167	abstract only
L. Pichon, I. Corral, H. Landrine, J. Mayer and D. Adams-Simms. Perceived Skin Cancer Risk among a Community-Based Sample of Black Adults. Annals of Behavioral Medicine. 2010. 39:209-209	Abstract only
M. Dickie and S. Gerking. Family Behavior: Implications for Health Benefits Transfer from Adults to Children. Environmental & Resource Economics. 2009. 43:31-43	No intervention
P. A. Andersen, D. B. Buller, J. H. Voeks, B. J. Walkosz, M. D. Scott, G. R. Cutter and M. B. Dignan. Testing the long-term effects of the Go Sun Smart worksite health communication campaign: A group-randomized experimental study. Journal of Communication. 2008. 58:447-471	Skiing excluded
L. M. Robertson, F. Douglas, A. Ludbrook, G. Reid and E. van Teijlingen. What works with men? A systematic review of health promoting interventions targeting men. Bmc Health Services Research. 2008. 8:	SR - only 1 study on skin cancer and outcome is attendance at screening, not our listed outcomes
N. Mallach and M. Eid. Skin cancer prevention for adolescents: Theory-based determinants for behavioral interventions. International Journal of Psychology. 2008. 43:151-151	Abstract only
J. L. Dykstra, M. Gerrard and F. X. Gibbons. Avoiding reactance: The utility of ultraviolet photography, persuasion, and parental protectiveness in improving the effectiveness of a UV exposure intervention. Annals of Behavioral Medicine. 2008. 35:S198-S198	Abstract only
N. C. Fernandez, J. Stone, J. Cooper, E. Cascio and M. Hogg. Vicarious hypocrisy: Bolstering attitudes towards the regular use of sunscreen to reduce dissonance after exposure to a hypocritical ingroup member. Annals of Behavioral Medicine. 2008. 35:S75-S75	Abstract only
E. Jennings, J. Whiteley, B. Marcus-Blank and M. Weinstock. Physical activity and sun protection behaviors in a randomized controlled physical activity trial. Annals of Behavioral Medicine. 2008. 35:S15-S15	Abstract only
J. Stapleton, N. R. Mastroleo, A. E. Ray and R. Turrisi. Changing resistant health behaviors: Use of a motivational interviewing approach to reduce indoor tanning behavior in college females. Annals of Behavioral Medicine. 2008. 35:S195-S195	Abstract only
M. Jonathan and B. Gerald-Mark. Inoculation theory: a framework for the reduction of skin cancer. Journal of Evidence-Based Social Work. 2010. 7:219-234	No patient outcomes
M. Saridi, E. Bourdaki and M. Rekleiti. Young students' knowledge about sun protection and its relation with sunburn incidence. A systematic review. Health Science Journal. 2014. 8:4-21	Not outcomes of interventions

Bibliographic Information	Exclusion Reason
S. J. Dobbinson, K. Jamsen, H. G. Dixon, M. J. Spittal, M. Lagerlund, J. E. Lipscomb, N. L. Herd, M. A. Wakefield and D. J. Hill. Assessing population-wide behaviour change: concordance of 10-year trends in self-reported and observed sun protection. International Journal of Public Health. 2014. 59:157-166	Not outcome of intervention
A. Williams, S. Grogan, D. Clark-Carter and E. Buckley. British adolescents' sun protection and UV exposure awareness. British Journal of School Nursing. 2013. 8:436-441	No intervention
S. Everett Jones, E. O'Malley Olsen, S. L. Michael and M. Saraiya. Association of UV Index and Sunscreen Use Among White High School Students in the United States. Journal of School Health. 2013. 83:750-756	No intervention
J. E. Moan, Z. Baturaite, M. Grigalavicius and A. Juzeniene. Sunbed use and cutaneous melanoma in Norway. Scandinavian Journal of Public Health. 2013. 41:812-817	No intervention
D. A. Strayer and T. Schub. Melanoma: Sunscreen Use. . 2013. :2p	Teaching material
D. A. Strayer and T. Schub. Melanoma: Risk Factors and Prevention. . 2013. :2p	Teaching materials
A. Collins. Practice implications for preventing population vulnerability related to vitamin D status. Journal of the American Association of Nurse Practitioners. 2013. 25:109-118	non-systematic review
H. Andrews. Skin and sun awareness and skin cancer prevention. British Journal of Healthcare Assistants. 2012. 6:582-588	report; no intervention;
Jonathan, R. Ruiter and H. De Vries. Preaching to the choir? The influence of personal relevance on the effects of gain- and loss-framed health-promoting messages. Journal of Health Psychology. 2012. 17:712-723	Not related to sun exposure
J. Gold, M. e. Hellard, M. S. Lim, H. Dixon, M. Wakefield and C. K. Aitken. Public-Private Partnerships for Health Promotion: The Experiences of the S⁵ Project. American Journal of Health Education. 2012. 43:250-253	Paper talks about challenges of this study; no results provided.
M. Townend. Factors to consider when offering pre-travel ski advice. Practice Nursing. 2013. 24:142-144	A health report; no study involved.
C. Wood. Sun and skin - Is travel health advice needed?. Travel Medicine & Infectious Disease. 2013. 11:438-439	A commentary - not a study
A. Gupta and B. A. Cohen. ULTRAVIOLET RADIATION EXPOSURE AND MELANOMA PROVIDING SAFER SKIN PRACTICES FOR CHILDREN. Contemporary Pediatrics. 2012. 29:10-14	not a SR or primary study
V. A. Russo, M. M. Van Acker, J. S. Vander Wal and A. A. Sinha. Patterns of use of sunless tanning product alternatives to indoor tanning among female college students. Archives of Dermatology. 2012. 148:855-857	no intervention, OECD
C. Knight. Looking at skin cancer and effective sun protection. British Journal of School Nursing. 2011. 6:220-224	not a SR or primary study
C. Caple and T. Schub. Melanoma: Effect of Education. . 2012. :2p	Teaching material
A. Mahoney, S. M. Swetter, K. B. Biello, E. A. Resnick, I. Feuerstein and A. C. Geller. Attitudes toward indoor tanning among users of sunless tanning products. Archives of Dermatology. 2012. 148:124-126	no intervention, OECD

Bibliographic Information	Exclusion Reason
H. Cho and N. Carcioppolo. Exploring the relationship between genre-specific television viewing and tanning beliefs and attitudes. International Public Health Journal. 2011. 3:53-61	cross sectional study, no intervention, OECD
C. Calianno. Influencing melanoma prevention. Nurse Practitioner. 2011. 36:6-10	not a SR or primary study
R. Dobson, U. C. Meier, M. Marta, S. Ramagopalan and G. Giovannoni. Vitamin D deficiency - do we follow our own advice?. Clinical Medicine. 2011. 11:521-523	assesses vitmain D levels as a sign of sun exposure, but does not report on any other outcome or barriers/facilitators
M. Felts, S. C. Burke, K. Vail-Smith and L. M. Whetstone. College students' knowledge, attitudes and perceptions of risks regarding intentional sun exposure: a 17-Year follow-up. American Journal of Health Education. 2010. 41:274-283	survey; no intervention
L. Wilson, S. Quine and M. Lewis. Hiding under the blankets: reasons why parents cover infants' strollers and prams. Neonatal, Paediatric & Child Health Nursing. 2010. 13:13-17	BaF Non UK
S. Silcox. Constructing a skin cancer campaign. Occupational Health. 2011. 63:20-22	Editorial not primary study
C. Knight. A basic guide to avoiding sunburn. Practice Nurse. 2011. 41:32-34	Guidelines, not a study
J. Croswell and Y. R. Shin. Behavioral counseling to prevent skin cancer. American Family Physician. 2012. 86:773-774	not a study; no intervention
E. J. Coups, C. J. Heckman and S. L. Manne. Melanoma risk and preventive behaviors among men and women... Am J Surg. 2010 Dec;200(6):765-8, discussion 768-9. American Journal of Surgery. 2012. 204:551-552	letter to the editor
S. Bird. Skin cancer prevention and teenagers: the role of schools. Education & Health. 2011. 29:8-10	review, not a study; no intervention
J. Imahiyerobo-Ip, I. Ip, S. Jamal, U. Nadiminti and M. Sanchez. Skin cancer awareness in communities of color. Journal of the American Academy of Dermatology. 2011. 64:198-200	survey; no intervention;
H. Cooper. Beat the heat: stay safe under the summer sun. Alive: Canada's Natural Health & Wellness Magazine. 2010.:51-53	Not a study design of interest
A. Willcox. Sun exposure. Practice Nursing. 2008. 19:449-452	report; not a study; no intervention
J. E. Fielding and S. M. Teutsch. Skin cancer prevention: sunnyside up or scrambled?. JNCI: Journal of the National Cancer Institute. 2010. 102:445-447	editorial - check we have identified Hunter to which this editorial refers
N. W. Burkhart. Sun exposure or tanning beds? RDH. 2012. 32:90-91	not patient outcomes of intervention
J. Kreisberg. Preparing patients for proper sun exposure. Integrative Medicine: A Clinician's Journal. 2009. 8:52-54	Editorial not primary study
S. Cumberland and C. Jurberg. From Australia to Brazil: sun worshippers beware. Bulletin of the World Health Organization. 2009. 87:574-576	report; not a study; no intervention;
T. A. Garberg. Understanding students' indoor tanning practices and beliefs. . 2008. :	Student behaviour and beliefs about indoor tanning in the US
A. Bozievich. Bringing change through education... Rachel Scobee. NEWS-Line for Nurse Practitioners. 2008. 14:4-7	not a SR or primary study
B. Diffey. Ultraviolet A sunbeds and vitamin D. Journal of the American Academy of Dermatology. 2011. 65:1059-1060	no intervention, letter
M. Fillon. Dermatologists start skin cancer awareness initiative. JNCI: Journal of the National Cancer Institute. 2012. 104:1272-1272	news article; no intervention;

Bibliographic Information	Exclusion Reason
E. J. Coups. Rural-urban differences in sunscreen use: clarification of results from the 2005 Health Information National Trends Survey. J Am Acad Dermatol. 2010 Jun;62(6):950-6. Journal of the American Academy of Dermatology. 2011. 64:196-197	no intervention, letter, OECD
G. Kenyon. Experts call for urgent skin-cancer awareness campaigns in Chile. Lancet Oncology. 2009. 10:319-320	not a SR or primary study
J. Jesitus. Tackling tanning: FTC throttles ITA campaign, but derms say battle continues. Dermatology Times. 2010. 31:22-22	not a SR or primary study
J. L. W. Fink. Texting increases sunscreen usage. RN. 2009. 72:14-14	news item
E. Croghan. Sun safety and risky behaviour. British Journal of School Nursing. 2008. 3:160-160	not a SR or primary study
C. Duffin. Book*let al*ters sunbed habits. Cancer Nursing Practice. 2008. 7:4-4	News
Sunburn survey leaves men red faced. 2011. :	news article
British Association of Dermatologists. A summary of key messages to be included in public information resources for the primary prevention of skin cancer.. . 2009. :	SR of key messages regarding sun exposure for public health; no intervention;
N. Bowtell and J. Verne. Summary of current policy drivers and national practice overview. . 2010. :	Non systematic review about health policy and funding related to skin cancer in the UK
N. Bowtell and J. Verne. Physical activity and the school environment. . 2010. :	Non-systematic review
L. Eagle, G. Kemp, J. Verne and S. Jones. The Impact of Role Models on Sun Protective Behaviours: Expert Paper. . 2010. :	Non-systematic review
Royal Australian College of General Practitioners. Guidelines for preventive activities in general practice. . 2012. :	General practice guideline, not specificially about sun protection/awareness
J. Wood. The Impact Of A Health Promotion Campaign To Raise Awareness Amongst Young People Of The Risks Associated With Sun Bed Use On Mental Well-Being. . 2008. :	Non systematic review
. Case study: Safer Sun Initiative - Wandsworth local authority. . 2011. :	No evaluation of outcomes, barriers or facilitators
L. Eagle, G. A. Kemp and A. Tapp. Social Marketing-Based Strategy For Sun Protection Interventions Report Prepared For The South West Public Health Observatory. . 2008. :	Non-systematic review
South West Public Health Observatory. Health behaviour outcome: skin cancer awareness and early diagnosis. . 2010. :	Information sheet provided to schools
. The Bronze Debate: Looking Gold Verses Getting Old. . 2010.	UK study; survey of attitudes-knowledge; no intervention;
SunSmart and Cancer Council Victoria. Skin cancer prevention: A blue chip investment in Victoria. . 2008. :	Evaluation of SunSmart program in Victoria, Australia
SunSmart and Cancer Council Victoria. SunSmart Program Report 2009-2013. . 2013.	Summary of SunSmart campaign in Victoria. Australia
S. Dobbinson. Reaction to the 1999/2000 SunSmart Campaign: results from a telephone survey of Victorians and a retail intercept survey of young people.	Pre 2008

APPENDIX D

Data Extraction Tables

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
Bird S and Dale R. 2011 **Design** Before and after evaluation of a skin cancer prevention intervention among pharmacies. **Country** UK **Quality** Moderate [+]	**Objectives** To train pharmacy staff to raise awareness of skin cancer prevention and spotting early sign, and encouraging early referral to a GP. To encourage people aged over 50 to check their skin and visit GP if appropriate, and to increase knowledge and confidence of pharmacy staff. **Outcomes and outcome measurement** Feedback from pharmacy staff training. Level of engagement with customers. Increased awareness and behaviour change.	Pharmacy staff in Devon. **Sample size** 42 pharmacies (41 analysed) in enhanced area and 34 in control area.	Before and after evaluation of a skin cancer prevention intervention among pharmacy staff. An enhanced area with 42 pharmacies was compared to a control area of 34 pharmacies. All pharmacies received the SunSmart campaign materials (postcards, leaflets, posters). The pharmacies in the enhanced area received in addition training and quizzes for customers to complete.	Confidence in talking to customers about skin cancer (enhanced pharmacies) Mean 5.24 (scale of 1-10)	570 conversations with over 50s were recorded in the enhanced are and 327 in the control area. Confidence in talking to customers about skin cancer Mean 8.83 Did you feel able to provide information through conversation and using the resources? Enhanced: mean 4.5 Control: mean 4.0 More conversations with customers were recorded in enhanced area (n=570) than in the control area (n=327). This was a statistically significant difference. Do you think the at the pharmacy is an effective setting to raise awareness of skin cancer prevention and early diagnosis? Enhanced: mean 4.6 Control: mean 4.2 Most conversations happened with females (62/38% split). The control group were more likely to have conversations with customers about sun protection methods (82% compared to 69%) but the enhanced group were more likely to have conversations about spotting the signs of skin cancer (57% compared to 44%). 81% of over 50s said that they would feel comfortable discussing the signs of skin cancer with a pharmacy member of staff. A number of pharmacies went above an beyond the campaign remit: “This was a great campaign – I was delighted to be

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
					involved. Staff have taken a real interest in skin awareness. I present a health topics show on local community radio station Riviera FM, so took the opportunity during the campaign to talk about skin cancer prevention and early diagnosis on the show, using what I learnt at the training. I had really positive feedback – listeners especially liked the 'ABCD' guidance to help them remember what to look out for." (Pharmacist manager)

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
Bird S and Dale R. 2012. **Design** Before and after evaluation of a skin cancer prevention intervention among teenagers. **Country** UK **Quality** Poor [-]	**Objectives** To use a UV facial scanner with students in order to increase their awareness of sun protection methods and skin cancer, and change their behaviour by adopting more safe sun habits. **Outcomes and outcome measurement** Questionnaire administered immediately before and immediately after the intervention.	College students and staff Colleges x 3 in Devon. **Sample size** n=66 beauty consultants; n=792 "before" training participants. n=61; unsure how many students were analysed. Study appears to say that it included only 15 to 34 year olds in the final analysis (n=665 before and n=483 who also completed an "after" questionnaire.). **Age (years)** 15 to 34 (analysed data). **Gender (female)** 60% **Ethnicity** Not reported	Before and after evaluation of a skin cancer prevention intervention among teenagers using an appearance-based intervention (UV scan shows the skin damage for the individual which is caused by excessive sun exposure).	No other sample characteristics reported.	Self confidence in advising clients about skin cancer prevention rose from 3.9 to 5.6 after training, on a scale of 1-7. 35% said that UV scanner had most impact on them during training session and 18% referred to the photos provide during the presentation. 15% were impacted by burning and damage to the skin, 12% by skin type and 6% by hearing about personal experience of melanoma. As a result of the training session 73% planned to use sunscreen, 9% said they would cover up and 6% said they would seek shade or avoid peak sun exposure time. Statistically significant different in intention to use higher SPF sunscreen (factor 15+) and to avoid getting sunburn after the training. Respondents provided a range of verbal comments on how they would change sun exposure and sun protection behaviour, but there were also unintended consequences of the intervention, e.g. “It was a good experience but because I had healthy skin with after seeing it in the UV scanner it didn’t really make me change my ways – but very useful!” “My skin looks better than I expected following my previous use of sunbeds and foreign holiday sun exposure”. Comments about the UV scanner: “very scary experience”, “I liked being able to

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
					see the parts where I had sun burn and learning that protective equipment when in the sun is important long term". Other comments included: "I love my skin because I never burn", "It was good to see how damaged my skin was", "I thought I looked after my skin, but will now do more. It was worse than I thought"

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
Butler D P, Lloyd-Lavery A, Archer C M G, *et al.* (2013) **Design** Survey **Country** UK **Quality** Poor [-]	**Objectives** To identify the current knowledge and awareness of and attitudes towards the avoidance of skin cancer among a variety of patient groups to aid the design of future UK sun-awareness campaigns. **Outcomes and outcome measurement** Which variables predict an individual's current knowledge and awareness of and attitudes towards the avoidance of skin cancer? Paper questionnaire. Appears to have been given to patients rather than being completed by a surveyor.	Patients attending GP practices x 3 in rural Oxfordshire, central Oxford and central London. **Sample size** 1000 **Age** 16-30 (27%) 31-45 (30.7%) 46-60 (22.2%) >60 (19.2%) Not completed (0.9%) **Gender (female)** 67.3% **Ethnicity** NR	Survey	History of skin cancer: personal or family Yes=131(13.1%), No=869 (86.9%)	70% reported that the media was the predominant source of information. 7% reported that their doctor was the predominant source and this rose to 15% for participants with a family or personal history of skin cancer. Levels of accurate knowledge. "Skin cancer is related to excess sunlight exposure": Agree response, M=86.4%, F=89.4%. Sun exposure and protection practices "I get sunburnt": At least once a year response: M=31.8%, F=32.1%. "I avoid the sun in the middle of the day": Always/most of the time response: M=49.5%, F=55.2%. "I use sunscreen when in the sun for more than 1 hour": Always/most of the time response M=38.6%, F=55.2%. "I wear protective clothing when in the sun": Always/most of the time response: M=47.7%, F=46.0%. Women were significantly more likely than men to wear sunscreen: M=38.6%, F=57.4% (p<0.001); People with a personal or family history of skin cancer were significantly more likely to wear sunscreen: Skin cancer history 62.3%, no skin cancer history 49.6%, p value not reported; Those aged 16-30 were significantly less likely to avoid the midday sun compared to older people (16-30 = 35.9%, 31-45=56.1%, 46-60=59.9%, >60=67.0%, p<0.001; Those aged 16-30 were significantly less likely to wear

					sunscreen always or most of the time: 16-30 = 44.6%, 31-45=57.7%, 46-60=54.1%, >60=47.9%, p<0.01; Those aged 16-30 were significantly less likely to wear protective clothing always or most of the time: 16-30 = 30.8%, 31-45=49.1%, 46-60=54.9%, >60=56.7%, p<0.001. Study participants who reported not wearing sunscreen when in the sun for over an hour (n=803) gave the following reasons: "Too expensive" n=45 (5.6%); "No time" n=55 (6.8%); "Want to get a tan" n=84(10.5%); "It doesn't protect me" n=20(25%); "I forget" n=355(44.2%); "I choose not to" n=84(10.5%); Other reason n=45 (5.6%); No reason given n=115 (14.3%).

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
Cancer Research UK. 2008. **Design** Focus groups and individual interviews: **Country** UK **Quality** Poor [-]	**Objectives** Qualitative investigation among 12-24 year olds to: identify motivations for seeking a tan and using sunbeds, and factors that will deter this age group from using sunbeds, and encourage them to stay safe in the sun; investigate awareness of the link between excessive exposure to UVR and the associated health risks; explore the perceived relevance of skin cancer to this age group; identify communication channels to reach the target audience most effectively; explore ideas and options for impactful campaign formats and creative concepts.	8 groups: • Girls aged 12-13 • Boys aged 12-13 • Girls aged 14-15 • Boys aged 14-15 • Girls aged 16-18 • Boys aged 16-18 • Women aged 19-24 • Men aged 19-24 **Sample size** Not reported. However, there were 4 to 8 participants in each group so the range would be 32 to 64. **Age** Age ranged from 12 to 24. **Gender (females)** Not specified **Ethnicity** NR	Focus groups and individual interviews: eight 90- min focus groups with 4 to 8 respondents in each group. And six 60-min in depth interviews, were conducted, across four different locations	No other characteristics reported.	a) A tan is considered very desirable for many young people and their desire for a tan is greater than their fear of skin cancer. b) Sunbed usage may be encouraged by mothers who use them. c) Reported use of sunscreen suggests it is often inadequately applied. d) 'Ageing' of skin is acknowledged as an issue for women. e) With respect to skin cancer, many feel it is not the most serious of cancers, and in any case associate it more with older people

Study details	Objectives and outcomes	Participants	Study methods	Baseline	Results
Cancer Research UK (2008) **Design** Focus groups and individual interviews **Country** UK **Quality** Poor [-]	**Objectives** Qualitative investigation to o assess knowledge, attitudes and understanding of sunburn among adults and teenagers in the UK to explore specifically: i. experience of sunburn and language used to describe it ii. understanding of sunburn/beliefs around sunburn iii. health risks of sunburn iv. messaging around sunburn	Adult men and women and teenagers both male and female. Groups were conducted across five different locations: Leeds, Manchester, Bristol, North London, Sunbury **Sample size** Unclear. The study reported 12 groups with adults (6-8 in each) and 20 groups with teenagers (4-6 in each). This would result in between 152 and 216 participants. **Age** Adult groups: 2 x women aged 19-30, no children 2 x men aged 19-30, no children 2 x women with children aged 0-4 2 x men with children aged 0-4 2 x women with children aged 5-15 2 x men with children aged 5-15 Teenage groups: 2 x girls aged 13-14; 2 x boys aged 13-14;	Focus groups and individual interviews: 32 groups in total: 12 x 90-min groups with adults (6-8 respondents in each) and 20 x 60-min groups with teenagers (4-6 respondents in each)	The study reported that half the groups were BC1, half were C2D (details of abbreviations not reported). All respondents were interested in getting a tan; most had normal/fair skins. All had had a holiday in a hot climate in the past three years.	Younger people believe that a bit of redness is just part of the tanning journey. There is a disconnect between actions now and consequences later among teenagers. There is little understanding about how sunburn can cause skin cancer. Many people believe that skin heals itself. Teenagers/young adults are more at risk of sunburn when they are away in the sun with their peer group. Young adults (19-30) are also likely to prize having a tan. Girls/young women are more preoccupied with tans than young men. Men are more interested in the science of sunburn. Parents, especially of 0-4s, are overall generally very careful to protect their children from the sun. Social class tendencies: BC1s generally take more of a long term perspective, generally more aware of health issues, and inclined to 'believe' if from trusted source; BC1 dads are more hands-on with children; C2Ds typically more 'live in the moment', aware of scare stories but may have rationalisations, some cynicism from the men, but C2Ds overall equally protective of young children.

		2 x girls aged 15-16; 2 x boys aged 15-16; 2 x girls aged 16-17; 2 x boys aged 16-17; 2 x girls aged 17-18; 2 x boys aged 17-18. **Gender (female)** NR **Ethnicity** NR			

Study details	Objectives and outcomes	Participants	Study methods	Results
Curtis B and Pollock K (2009) **Design** Focus group **Country** UK **Quality** Poor [-]	**Objectives** To explore influences on the sun exposure behaviours of girls in the UK, aged 12–15 years, and reflect on the role of the school nurse in relation to the study findings.	Two secondary schools in Nottingham. 12 to 15 year old school girls. **Sample size** n=28 **Age** Age range = 12 to 15 years. **Gender** 100% female **Ethnicity** Not reported	Focus group discussions using semi structured format, using prompts to maintain focus. Each focus group discussion lasted 40 minutes. Each discussion was audiotaped.	Key themes from the focus groups were: The desire for a tan - looks attractive and healthy. Attitudes towards sun protection - sunscreen used inappropriately, ignorance about protection factor, dislike of application of sun screen cream, dislike clothing for protection as it leaves "lines" in the tan. Risk perception - girls were detached from dangers of sun exposure. Misconceptions- knowledge about sun exposure was vague and founded on misconceptions. External influences - peers appear to encourage tanning but parents encouraged healthy behaviour. Role models such as models and celebrities were tanned and appeared attractive to the respondents. Health promotion messages in the media were discussed, with adolescents being able to recall adverts and remember the health messages in them. However, girls felt that the messages did not target their age group as they mainly focused on younger children and adults. Additionally, participants stated that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan. ‘People are so tanned in [sun safety] adverts, it just makes you want to tan more.’ (Beth, Year 8) Participants stated that even in health promotion messages, including adverts for sunscreen, models continued to be depicted as brown and attractive, and therefore encouraged a desire for a tan. ‘People are so tanned in [sun safety] adverts, it just makes you want to tan more.’ (Beth, Year 8)

Study details	Objectives and outcomes	Participants	Intervention/Comparator	Results
Diffey BL and Norridge Z (2009) **Design** Online quantitative survey. **Country** UK **Quality** Poor [-]	**Objectives** To provide data about reported sun exposure and relate this to sun protection behaviour and attitudes towards skin cancer risk. **Outcomes and outcome measurement** How much time website visitors spent in the sun; Preferred forms of sun protection; Use of tools such as sun-reactive skin type and UV index.	Visitors to SunSmart website. **Sample size** 2061 respondents of whom 1943 reported their sex and age. **Age (years)** Mean age not reported. The response rate of adults (> 18 years of age) showed an over-representation of the young /middle years (25–50 years) relative to the U.K. population, with very few elderly (> 65 years) respondents. **Gender (female)** 79% (n=1532) **Ethnicity** NR	Online quantitative survey. All visitors to SunSmart website were invited to complete an online survey. The survey consisted of 18 questions subdivided into five subsections. Topics were relevant to both general sun protection issues and the focus of the 2007 SunSmart campaign: sunburn and holidaymakers.	Although only one-third of respondents reported using the UV index at least once or twice to plan their sun exposure, logistic regression analysis showed that this minority was less likely to burn [OR 0.77; 95% confidence interval (CI) 0.63–0.95] than the two-thirds who claimed never to have used the UV index. However, a second logistic regression analysis showed that the use of UV index did not appear to influence the use of several methods of sun protection. Use UV index" No" Odds ratio (95%CI) = 1.0 (referent) p value = 0.1564 "Yes"= 1.17 (0.94–1.45). Logistic regression analysis showed that the strongest predictor for recent sunburn was age, with young people under 35 years of age being 2.34 times more likely to report recent sunburn than older people (P < 0.0001).A further significant predictor was a moderate or high perception of risk of skin cancer compared with those people who considered themselves at low or no risk. OR [95%CI]= 1.83[1.46–2.29] p value<0.0001.Another key finding was that people who checked their skin regularly for changes reported significantly fewer episodes of sunburn (OR 0.70; 95% CI 0.56–0.87). In a second regression analysis , the strongest predictor for the use of sun protection tools was predisposition to sunburn, with people reporting melano-compromised skin more than twice as likely to adopt two or more sun protection strategies as people who tolerate sunlight well. Melano-competent / protected OR = 1.0 (referent) p < 0.0001, Melano-compromised OR[95%CI] = 2.24 (1.83–2.74). Only one other factor achieved statistical significance: people who say they regularly check their skin for changes were more likely than people who do not do this: OR[95%CI]=1.33 (1.06–1.67), p=0.0129.

Study details	Objectives and outcomes	Study details	Systematic review methods	Results
Eagle L, (2009). **Design** Systematic review **Country of primary studies** All OECD countries. N=7 from UK. **Quality** Moderate [+]	**Objectives** What are the effective and cost effective ways of providing information to change people's knowledge, awareness and behaviour? What content do effective and cost effective primary prevention messages contain? What is the most effective and cost effective content? **Outcomes and outcome measurement** Findings were synthesised into the following themes: mass consumer media; educational ; home; recreational; workplace; medical practice; hospital. Evidence statements have been generated using the above categorisation of the studies and applicability ratings have been derived using the author's judgement.	For children the setting was mostly school and for adults mostly universities. Some adult studies were conducted in medical centres and workplaces Approximately one-third of studies involved children and two-thirds involved adults. The largest number of studies reviewed relate to delivery within educational environments. **Number of studies** 50 RCTs, 11 controlled before and after studies, and 23 before and after studies.	This SR is a synthesis of findings reported in an earlier review by Malottki *et al* 2009. Most of the data extraction has been taken from Malottki *et al* while the data extraction for results have been taken from the report by Eagle. **Inclusion criteria**: Populations: everyone. Interventions aimed at primary prevention of skin cancer were: One-to-one or group-based verbal advice; mass-media campaigns; printed materials; the Internet, mobile phones. Setting: any. Comparator: current information provision, do nothing or any other intervention listed above. Locations: Developed/OECD countries. 1990 onwards. Studies: RCTs, Longitudinal intervention studies. **Exclusion criteria**: Not explicitly stated.	Traditional media still appears to play a significant role in people's lives but increasingly media are used simultaneously, such as radio listening and internet-based activity occurring at the same time . While mass media interventions have been proven successful on raising awareness levels, they are rarely sufficiently strong to generate behaviour change, suggesting other information sources should be investigated for the latter. Bränström *et al.* (2003) used different combinations of brochures with or without UVR intensity indicators with adults from general population and reported a significant increase in sun protection knowledge and decrease in sunbathing frequency (follow-up period unclear). Barriers to communication effectiveness among adolescents and young adults are reported under the following headings: normative beliefs; unrealistic optimism/personal risk denial; and children's cognitive development. Further barriers to communication come from conflicting messages from both media editorial and programme content, including holiday / beach activity portrayal, celebrity portrayal which glamorises tanning.

Study details	Objectives and outcomes	Participants	Intervention/Comparator	Results
French DP and Hevey D (2008) **Design** Think aloud methods.. **Country** UK **Quality** Moderate [+]	**Objectives** To code and count the beliefs elicited when ‘‘unrealistic optimism’’ questionnaire items are completed. To test whether the number of beliefs elicited differed in response to direct or indirect measures of unrealistic optimism. To examine the association between the numerical ratings made, and the beliefs elicited and coded in response to the same question, that is, which beliefs are associated with actual ratings made? **Outcomes and outcome measurement** Students completed a questionnaire that elicited responses using a rating scale. At the same time their "thinking aloud" responses were recorded by researchers.	Undergraduate students at a large university in the English Midlands, UK. **Sample size** n=40 **Age (years)** 18 to 24 **Gender (female)** 50% **Ethnicity** NR	The thoughts of participants who displayed unrealistic optimism about risks of skin cancer were elicited using think aloud methods, when completing both direct and indirect ratings of unrealistic optimism.	The most common thoughts overall, when considering the risk of skin cancer, concerned exposure to the sun and features such as skin colouring. Few participants considered prevalence of skin cancer in their response to any of the questions: Frequencies of participants (N=40) mentioning thoughts in response to direct and/or indirect questions were n =17 for sun exposure, n=19 for features such as skin colouring and n=9 for prevalence. There is evidence for unrealistic optimism in ratings of skin cancer risk in this study. That is, the tendency for the majority of people to estimate their personal risk of being affected by an adverse event as lower than that of the average person within a defined population. For the direct measure, the mean ratings (M=3.48;SD=0.96) for this sample were significantly lower than the midpoint value of ‘‘4’’ (t[39]= 3.46, p<.001). This indicates that as a group they thought they were less likely than a peer of the same age and sex to develop skin cancer at some stage of their life. Similarly, mean ratings (M=3.08, SD=1.00) of absolute personal risk were significantly lower than mean ratings (M=4.05, SD=1.26) of absolute peer risk in a repeated measures t-test (t[39]=4.45, p5.001). Consequently, an indirect measure, derived by subtracting personal risk from peer risk (M=0.98, SD=1.39), was significantly higher than zero, as assessed by a one-sided t-test (t[39]=0.98, p<.001). People do not seem to think about numerical probabilities when estimating risk, but instead appear to focus on issues such as exposure to risk, and concrete bodily symptoms and signs. This may at least partially explain why attempts to influence behaviour by providing probabilistic information are generally unsuccessful.

Study details	Objectives and outcomes	Systematic review methods	Results

Garside R, *et al* 2009
 	
Design
 	
Systematic Review
 	
Country of primary studies
 	
UK=5; USA=4; Australia = 3; New Zealand =1; Canada = 1 (two study reports); and comparison of policies in Australia, Canada and England =1.
 	
Quality
 	
Good [++]
	Objectives
	
	What factors help to convey information to prevent the first occurrence of skin cancer attributable to UV exposure?
	
	What factors hinder the communication of primary prevention messages about skin cancer?
	
	What environmental, social and cultural factors (covering financial/human resource factors) prevent or support the uptake of the information.
	
	Availability and accessibility for different populations.
	
	Views about the content of information provided or the way in which it is conveyed.
	
	Outcomes and outcome measurement
	
	Reduction in the incidence of morbidity and mortality from skin cancer.
	
	Increase in knowledge and awareness that can lead to a reduction in the incidence of exposure/over-exposure to natural and artificial UV..
		Inclusion criteria:
		Populations: everyone.
		
		Interventions: universal and targeted interventions aiming at primary prevention of skin cancer including: verbal advice; mass-media campaigns; printed information; new media (the Internet, e-media and text messaging).
		
		Settings: all.
		Locations: Developed/OECD countries. Time period: 1990 onwards.
		Study designs: systematic reviews of qualitative research; primary qualitative research designs.
		
		Exclusion criteria:
		
		Interventions: secondary prevention; primary prevention combining information provision with another type of intervention; provision of sun protection; policy changes; skin cancer screening programmes; assessment of the accuracy of effective information resources; clinical diagnosis, treatment and management of skin cancer.
		
		Locations: non-OECD countries.
		
		Study types: the relationship between sun exposure and skin cancer; clinical diagnosis, treatment and management of skin cancer. dissertations/thesis, books and book chapters. Language: Non-English language studies.
		
		Analysis:
		
		Two reviewers read and re-read the extracted
			Setting
			
			School or university = 6;
			
			social centre = 1;
			
			not stated = 7; workplace =1;
			
			not applicable =1.
			
			Participants
			
			School pupils (n=4 studies),
			
			health care professionals (n=1),
			
			school staff (n=1),
			
			university students (n=3),
			
			adults in tanning salon (n=1),
			
			adolescents + parents (n=1),
			
			parents of young children (n=1),
			
			adults seeking advice about skin cancer (n=1),
			
			adults > 55 (n=1),
			
			adults not specified (n=1),
			
			adults who travel abroad (n=1).
			
			Number of studies
			
			16 studies in total. 13 were focus groups and/or interviews; 1 comparative framing

Study details	Objectives and outcomes	Systematic review methods	Results
	Changes in behaviours that can lead to a reduction in the incidence of exposure/over-exposure to natural and artificial UV. Increase in knowledge and awareness of the ways to prevent skin cancer. The contents of an intervention that is effective and cost-effective. Any adverse or unintended (positive and negative) effects of the intervention.	findings shown in the evidence tables and developed a coding frame to identify key themes across the included studies. A number of the studies used the Health Belief Model as an explanatory framework through which to interpret their findings. Extracted findings were coded using this framework, and similar codes drawn together in a narrative which synthesised the study findings.	and narrative analysis of programmes; 1 cognitive interviews testing existing survey questions; and 1 mixed methods. Generally, participants perceive their susceptibility to skin cancer as low, and do not perceive the results of UV exposure to be severe. They believe that skin cancer is not severe and can be easily cured. Barriers to adopting safer skin cancer prevention behaviour relate to positive perceptions of tans, the hassle of covering up or applying sunscreen, challenges to altering existing structures and procedures in schools, the limits of adult responsibility when protecting children from sun exposure and positive associations with being outdoors. In relation to secondary consideration it is noted that there is a perception that darker skin tones are protective against skin cancer. In addition, there is some suggestion that photo-aging of the skin is a more immediate concern than skin cancer for some, perhaps particularly women. School and recreation workers recognised their potential role in educating parents (Geller *et al*, 2008 and Glanz *et al* 1999). P.55

Study details	Objectives and outcomes	Participants	Study methods	Results
Gavin A, , *et al.* (2011) **Design** Survey. Mailed questionnaire **Country** Northern Ireland **Quality** Poor [-]	**Objectives** To document skin cancer knowledge and trends in reported sun avoidance and sun protection behaviours **Outcomes and outcome measurement** Sun care behaviour, knowledge and attitudes gathered by questionnaire.	General population ≥16 years. **Sample size** 3623 over the eight-year period (numbers for each year not presented). **Age** 52% of respondents in the 2008 survey were aged ≥ 45 years. **Gender** Female to male ratio = 1.2:1. **Ethnicity** NR	Survey. Mailed questionnaire to random selection of addresses throughout Northern Ireland.	The most commonly reported source of sun care information (2008) was television (79%), magazines (52%), newspapers (49%), health professionals (35%) and family and friends (31%). 97% of participants had heard of skin cancer (2008). No data reported for 2000 or 2004. The study does not give any details about the question(s) used to elicit these responses Older people were significantly more likely than younger people to avoid sun exposure and practice sun protection. Females were significantly more likely than males to avoid sun exposure and practice sun protection.

Study details	Objectives and outcomes	Participants	Intervention/Comparator	Results
Hedges T, and Scriven A. (2010) **Design** Survey using a questionnaire for face to face interviews. **Country** UK **Quality** Poor [-]	**Objectives** To examine the knowledge, attitude and behaviour of young adult public park users in terms of risks associated with sun exposure.	Young adult public park users in 2 London parks. **Sample size** 100 **Age (years)** 18-28. **Gender (female)** 56% females **Ethnicity** Caucasian. **Uother information** Skin Types I-IV, on the Fitzpatrick skin type, and English or Welsh origin (for school curriculum similarity)	Survey using a questionnaire for face to face interviews. Participants were asked during the course of the interview about their age range, skin type, nationality, gender, level of education completed, and the type of school they attended. They were asked two questions on their attitudes, two knowledge-based questions and nine behaviour-based questions.	Source of knowledge on risks of sun exposure: 'parents and family' (28%) as a source of knowledge, followed by television, then magazines and newspapers (52% total). School education made up only 4% of responses. Level of accurate knowledge: knowledge of risks associated with sun exposure was high (data not reported), participants being aware of skin ageing and skin cancer, and risks associated with childhood exposure, having skin type I, the presence of moles and being sunburnt as an adult. Knowledge of sun protection methods showed that 98% of females and 93% of males strongly agreed or agreed with the statement 'sunbathing without using suntan lotion increases my risk of skin cancer'. When asked 'What actions can reduce the risk of skin cancer?' sunscreen use was the most frequent response, 87 participants cited some form of sunscreen as a sun protection action. Sun exposure and protection practices: Participants were asked 'what do you do to protect yourself from the sun and/or skin cancer?' using 12 pre-coded responses to the question. Over half of the 100 respondents proposed only one sun protection action undertaken by them. Sunscreen use was chosen by 89% of the participants. Only 17% of the participants' actual sun protection behaviour in the park during the interview corresponded accordingly with their response to the original question. 'what reasons deter you from using sun protection methods?' The oldest age group (25–28 years) cited more barriers overall, mostly in respect to sunscreen use, followed by barriers to wearing hats. The main concern for this age group was cosmetics and comfort. The 21–24 years age group's main concern with use of sun protection methods was convenience, and the youngest age group cited few barriers with no overwhelming distinct type of barrier. In terms of gender, males cited convenience over cosmetic (females) as the primary barrier to use of sun protection methods; followed by males having concern over expense

Study details	Objectives and outcomes	Participants	Intervention/Comparator	Results
				(sunscreen) and females over other non-descript barriers, such as weather conditions not requiring sun protection methods to be used. <u>Attitudes towards having a suntan</u> Participants were asked if 'a suntan makes [them] look more attractive'. There was a strong positive response, higher in females (93%) than males (73%), the only negative response came from skin type I participants. Participants were asked if they considered a suntan made them look healthier, of note is that 75% of males and 91% of females strongly agree or agree that a suntan makes them look healthier. 20% of males neither agree nor disagree that a suntan makes them look healthier in comparison to 4% of females. 2% percent of females strongly disagree that a suntan makes them look healthier.

Study details	Objectives and outcomes	Systematic review methods	Results Comments
Lorenc T, Jamal T and Cooper C. 2010 **Design** **Systematic review** **Country of primary studies** UK, USA, Australia, Canada, New Zealand and Sweden **Quality** Good [++]	**Objectives** What factors help or hinder the provision or use of the following to prevent the first occurrence of skin cancer attributable to UV exposure? - sun protection resources; - physical changes to the natural or built environment (such as shelters and other areas of shade in public spaces or school grounds); and - multi-component interventions. What are the views of people who may use prevention services? What are the views of service providers? How do these views differ by population characteristics (e.g. age, ethnicity)? What environmental, social or cultural factors may prevent or support the uptake or effective use of sun protection resources or use of physical environmental changes made to help prevent skin cancer? To what extent are such interventions available and accessible to different groups in the	**Inclusion criteria:** Addresses the primary prevention of skin cancer due to UV exposure, or reports views relating to skin cancer, sunbathing or tanning; presents qualitative research; Published in 1990 or later; Published in English; Presents views relating to environmental change; resource provision; multi-method interventions; views on the potential barriers or facilitators relating to skin cancer prevention activities. Conducted in a OECD country. **Analysis** A framework based on the Health Belief (HB) Model was used to synthesise the data. The HB model tries to explain health actions through the interaction of three sets of beliefs: ● perceived susceptibility ● perceived seriousness ● perceived benefits and disadvantages. The findings data were coded and the five main themes were: perceived susceptibility (skin cancer); perceived severity (skin cancer); perceived benefits (sun protection); perceived barriers (sun protection); and cues to action.	**Number of studies** 22 primary studies included. All studies used interviews or focus groups. 5 studies combined qualitative with quantitative methods. **Participants** 9 studies focused on children and young people, 6 studies on young adults, 1 studies on older people, 4 studies of parents, 2 studies of school staff, 2 studies of women and 1 of men. 6 studies of school setting. **Results** All five themes from the Health Belief mode appear pertinent to this question. Perceived benefits: the benefits to be gained from skin cancer prevention or sun protection activities (n=8 studies). None of the studies were conducted in the UK or Europe. Perceived barriers: factors which may make it less likely that individuals will engage in preventive activity e.g. - Positive perceptions of a tanned appearance (n=12, n=2 from UK); perceived health benefits of sun exposure (n=7, n=1 from UK); routes to tanning (n=8, n=3 from UK); social barriers to sun protection (n=10, n=2 from UK; practical barriers (n=10, n= 2 from UK);

Study details	Objectives and outcomes	Systematic review methods	Results Comments
	population? **<u>Outcomes and outcome measurement</u>** Data synthesis was used to address the research questions: barriers and facilitators to the implementation of interventions, and differences in views between subgroups of the population.		institutional barriers (n=2, n=0 from UK). One of the five themes that emerged from the findings data was "Cue to action". Within that theme (n= 6 studies, n=0 from UK) discuss the role of institutional policies as cues to action including staff attitudes to those policies. n=6 studies (n=0 from the UK) find that sun exposure, or a tanned appearance, are associated with a healthy, active lifestyle. Service providers are generally optimistic about the prospects for intervention and policy change, and willing to take an active role in implementing policy. Staff in schools who have implemented integrated sun-protection policies are actively engaged in modelling and encouraging good sun protection practices. However, in some cases, potential service providers are concerned about the potential extension to their responsibilities. There is also the risk of an overload of policies and recommendations.

Study details	Objectives and outcomes	Participants	Intervention/ Comparator	Baseline	Results
Madgwick P *et al.* (2011) **Design** Survey by postal questionnaire. **Country** UK **Quality** Poor [-]	**Objectives** To evaluate the socio-demographic and occupational characteristics associated with the use of sun safety measures among construction workers in Britain.	Male construction workers in Britain, who worked outside. **Sample size** 360 (37% response rate) **Age (years)** 41.1 (11.8). (range 18-66). **Gender (female)** 0% **Ethnicity** NR	Survey. Postal questionnaire of construction workers in small, medium and large construction companies.	Experience of cancer: 2% Experience eof close friend/family member with skin cancer: 7%. 73% expressed a desire to have a suntan and 90% reported using sunscreen when on holiday. Job tenure ranged from 1 month to 51 years (M, 17.1; SD, 12.3), and 78% reported having received sun safety training. The number of hours worked outside per day ranged from 0.5 to 13 (M, 6.6; SD, 2.8).	Participants were asked about training received on the risks of sun exposure. This was not reported for the whole sample but was used as a variable to calculate correlations to assess associations between training and use of sun safety measures. Source of knowledge: Participants were asked about training received on the risks of sun exposure at work. Levels of accurate knowledge: Not reported. Sun exposure and protection practices: Frequency of sun safety behaviours used were ranked from highest to lowest. The three most common measures reported were plentiful water intake (89%), sunscreen application (60%) and the wearing of long sleeved, loose fitting tops and trousers (51%). Plentiful water intake (OR, 0.97; 95% CI, 0.94–1.00) was negatively associated with age. Wearing long sleeved loose fitting tops and trousers (OR, 1.03; 95% CI, 1.01–1.05) was positively associated with age; Wearing long sleeved loose fitting tops and trousers (OR, 0.47; 95% CI, 0.29–0.76) was negatively associated with desire for a suntan; Plentiful water intake (OR, 2.60; 95%CI, 1.09–6.18) and sunscreen application (OR, 9.60; 95% CI, 3.89–23.7) were positively associated with sunscreen use on holiday; Checking the ultraviolet (UV) index for the day (OR, 2.40; 95% CI, 1.01–5.71) was positively associated with personal or close friend/family experience of skin cancer. The wearing of long sleeved, loose fitting tops and trousers (OR, 1.69; 95% CI, 1.02–2.80) and the use of sunglasses (OR, 1.85;

Study details	Objectives and outcomes	Participants	Intervention/ Comparator	Baseline	Results
					95% CI, 1.10–3.13) was positively associated with receipt of sun safety training: sunscreen application (OR, 1.12; 95% CI, 1.03–1.21); Wearing long sleeved, loose fitting tops and trousers (OR, 1.10; 95% CI, 1.02–1.18); regular checking of skin for moles or unusual changes (OR, 1.13; 95% CI, 1.05–1.23); wearing wide brimmed hats with neck protection (OR, 1.16; 95% CI, 1.05–1.28) and checking the UV index for the day (OR, 1.16; 95% CI, 1.02–1.31) was positively associated with hours worked outdoors.

Study details	Objectives and outcomes	Participants	Intervention/Comparator	Results
Mewse AJ, *et al.* (2011) **Design** Survey. **Country** Wales **Quality** Moderate [+]	**Objectives** Do adolescent friends share similar sun exposure and sun protective behaviours and, if so, might parenting background offer a useful theoretical framework within which this association might be interpreted. Will adolescents and their friends show similarities in their sun exposure, sun protective behaviours and their perceptions of parenting style? Will perceived authoritative parenting be positively associated with adolescent sun protective behaviours even after the effects of other variables in the family and peer environments are controlled? Will perceived authoritative parenting be negatively associated with adolescent sun exposure behaviour even after the effects of other variables in the family and peer environments are controlled? Will friends' parents' perceived authoritativeness be positively associated with adolescents' sun protective behaviours and negatively associated with adolescents' sun exposure behaviour after the effects of the adolescents' own parents' perceived authoritativeness and other family and peer variables are controlled?	Adolescents **Sample size** 402 analysed: n=357 (some participants did not add friends' names to questionnaire) **Age (years)** 14.47 (1.29) (range 13 to 17). **Gender (female)** 51% **Ethnicity** Almost all were British Caucasian. Exact numbers not reported.	Survey conducted in one mixed gender secondary school in small South Wales, coastal town. Questionnaire administered and completed in silence in the classroom.	Regression analysis results showed there were significant effects of friends' and parents' sun protection behaviours, adolescents' attitudes towards suntans, sunbathing with parents and skin type, but not of age, gender or parental disapproval of unprotected sunbathing. Parental authoritativeness emerged as a strongly positive predictor of protected exposure, even with adolescents' attitudes and parents' and friends' behaviour taken into account. Friends' parents' authoritativeness had an independent protective effect over and above the effect of friends' own behaviour and of adolescents' own parents' authoritativeness.

Study details	Objectives and outcomes	Participants	Study methods	Results
Morris J, *et al.*. (2011) **Design** Survey. **Country** UK **Quality** Poor [-]	**Objectives** To explore the awareness and understanding of global solar UV index (UVI) information presented to the public in weather forecasts and whether individuals changed their sun exposure/protection behaviour as a result of receiving such information. **Outcomes and outcome measurement** Level of awareness and understanding of global solar UV index (UVI) information presented to the public in weather forecasts and whether individuals change their sun exposure/protection behaviour as a result of receiving such information? Face to face interviews	Teenagers and adults on holiday or resident in Devon and Cornwall **Sample size** 466 (251 residents and 215 tourists). **Age (years)** 16–34: 156, 35–54: 158, 55+: 152. **Gender (female)** 50% **Ethnicity** NR	Face to face interviews. Questionnaire had 21 questions which included three about the participants' incidence of sunburn and use of sun protection behaviours; 13 about awareness and knowledge of the UVI; two about sun seeking behaviour; and 3 that related specifically to the UVI displayed by the UK Met Office. Study was conducted in Devon and Cornwall with a pre-specified sample size, both overall and within each sub-group (location beach/town centre, tourist/resident, age and gender). Ten locations were selected to represent five towns (three urban and two coastal) and five beach areas.	Main sources of information about UVI were national and local television (49% and 48% respectively). Overall, 60% (n = 214) of participants who had heard/possibly heard of the UVI indicated that knowing the UVI value did not influence their sun protection behaviour. There were significant differences between gender with more males stating such information would not influence their behaviour (70% compared with 49% females; chi square = 15.54, $p < 0.0001$); and perception of burn in strong sun with more in the categories suggesting they did not burn easily in strong sun stating UVI information would not influence their sun protection behaviour (72% 'not very easily', 64% 'not easily at all', 61% 'never'; Chi square = 18.12, df = 8, $p < 0.05$). Overall, 60% (n = 214) of participants who had heard/possibly heard of the UVI indicated that knowing the UVI value did not influence their sun protection behaviour. There were significant differences between gender with more males stating such information would not influence their behaviour (70% compared with 49% females; chi square = 15.54, $p < 0.0001$); and perception of burn in strong sun with more in the categories suggesting they did not burn easily in strong sun stating UVI information would not influence their sun protection behaviour (72% 'not very easily', 64% 'not easily at all', 61% 'never'; Chi square = 18.12, df = 8, $p < 0.05$).

Study details	Objectives and outcomes	Participants	Study methods	Results
Nicholls S *et al* (2009) **Design** Survey of information leaflets about skin cancer and sun-protective behaviour. **Country** UK **Quality** Moderate [+]	**Objectives** To assess the quality of patient information leaflets about skin cancer and sun-protective behaviour available from general practices and community pharmacies.	General practices and community pharmacies. **Sample size** 61 general practices 62 pharmacies 31 information leaflets.	Written postal request for all relevant leaflets were sent to community pharmacies and general practices in Brighton & Hove City Teaching Primary Care Trust. Request included a stamped addressed envelope.	Of the 31 leaflets returned, 10 were over 5 years old, and most (n = 18) were about sun protection more than skin cancer per se (n= 11). Sources were primarily NHS (n= 9) and commercial (n= 8). Information leaflets about skin cancer and sun protection were of variable quality in presentation and content. The majority of leaflets met the EQIP criteria of 'respectful tone' (97%), short sentences (81%), and clear language (81%). Of note, there were five criteria that were not met by at least 12/31 of the leaflets (use of generic names for medicines/products; the purpose, benefits, side-effects and alternatives of any test, medication or product). All required a reading age higher than recommended (≤5): SMOG scores ranging from 6 to 15 (mode 10, mean 10.3, SD 1.3. All leaflets with major inaccuracies had links with commercial organizations. Fourteen leaflets were judged to be completely accurate. Thirty minor inaccuracies were identified in 17 leaflets, and 18 major inaccuracies in five leaflets.

Study details	Objectives and outcomes	Participants	Study methods	Results
Williams AL, *et al.* (2012) **Design** Qualitative study using individual interviews and focus groups. **Country** UK **Quality** Poor [-]	**Objectives** To investigate women's experiences of taking part in an appearance-focussed intervention which involved seeing how their faces would age with and without UV exposure.	Female students **Sample size** 47 **Age (years)** 23.7 (range: 18 to 34). **Gender (female)** 100% **Ethnicity** NR **Other information** Predominantly Fitzpatrick Skin Type III	Photographs were taken of participants' face and the effect of UV aging was shown using APRIL Age Progression Software. Participants were asked questions while viewing 2 photos: one of their face without UV aging (assuming that protection had been used) and one with UV aging. Participants were allowed to dicuss issues that were important to them and to elaborate on answers if necessary. Focus groups were conducted in a similar way, but after viewing photos the participants took part in a group discussion about the intervention. The transcribed sessions were subjected to thermatic analysis.	Key themes arising from the transcripts were: (1)Shock Reaction to the effects of UV exposure on appearance. All participants noted the difference between the photos and many expressed shock at the difference, making explicit comparisons between the two. All 47 participants rate the aged photo as less desirable and none rejected the UV-aged photo as unrealistic or unlikely to occur. 14 participants compared the aged photos to images of ugliness such as witches or monsters. The nagtive comparisons were linked explicitly to behaviour change: "I'd probably try and remember to use more sun cream (.) because the one without [UV exposure] looks better than the one with [UV exposure]". Participants used words such as "horrible" (n=11) and disgusting (n=6) to describe how they felt their faces looked with UV-ageing. The women were concerned about wrinkling (n=34), spots (n=30) and sagging (n-=13). All of the participants said that viewing the photographs would have an effect on their future sun protection and/or UV exposure behaviours. Seeing the photos of their own faces was said to be helpful because the women could relate to the photos.A number of women compared their faces to their mother (n=12) or grandmother (n=8), emphasising the sense of personal risk experienced.

Study details	Objectives and outcomes	Participants	Study methods	Results
Williams AL, *et al.* (2013) **Design** Qualitative study using individual interviews and focus groups. **Country** UK **Quality** Poor [-]	**Objectives** To investigate men's experiences of taking part in an age-appearance-focussed intervention which involved seeing how their faces would age with and without UV exposure.	Male university students **Sample size** 43 **Age (years)** 23.82 (4.23) (range: 18 to 34). **Gender (female)** 0% **Ethnicity** NR **Other information** Fitzpatrick Skin Type III (40.0%).	Thirty-five men took part in individual sessions, and a separate sample of eight took part in two focus groups, with four men in each group.	Appearance-based interventions may be more effective than health-based interventions. 32/43 participants felt that viewing the photographs may have an effect on their future sun protection and/or sun exposure behaviours, which was linked to the shock of seeing the effect of UV exposure on their skin. 10 participants felt that viewing the photographs would have no effect on their future sun protection and/or UV exposure behaviours, and one participant said that he did not know if it would have an effect. A number of the participants brought out positive impacts of the way that they looked in the aged photographs, citing male-appropriate appearance factors such as looking tough. Key themes arising from the transcripts were: Shock Reaction to the effects of UV exposure on appearance, for example, through the use of words such as "God" (n = 9), "wow" (n = 3), and "urgh" (n = 4). Behaviour Change Motivations after viewing photographs, for example, of the 43 participants, 32 felt that viewing the photographs may have an effect on their future sun protection and/or sun exposure behaviours. However, a number of the participants brought out positive impacts of the way that they looked in the aged photographs, citing male-appropriate appearance factors such as looking tough. Ten of the participants felt that viewing the photographs would have no effect on their future sun protection and/or UV exposure behaviours. A number of these participants brought out positive impacts of the way that they looked in the aged photographs, citing male-appropriate appearance factors such as looking tough.

Study details	Objectives and outcomes	Participants	Study methods	Results
Williams AL, *et al.* (2013b) **Design** Qualitative study using focus groups. **Country** UK (Wales) **Quality** Poor [-]	**Objectives** To investigate adoelscents' experiences of taking part in an age-appearance-focussed intervention which involved seeing how their faces would age with and without UV exposure.	School children **Sample size** 60 **Age (years)** 12.58 (1.2) (range: 11 to 14). **Gender (female)** 50% **Ethnicity** 100% Caucasian	Sixty randomly selected children took part in ten focus groups of six participants.	Appearance-based interventions may be more effective than health-based interventions. The majority (unspecified) of participants felt that viewing the photographs would have an effect on their future sun protection and/or sun exposure behaviours, which was linked to the shock of seeing the effect of UV exposure on their skin.. Key themes arising from the transcripts were: Shock Reaction to the effects of UV exposure on appearance, for example, through the use of words such as "Oh my God"/"Oh God" (n = 35) and "urgh" (n = 37). All participants noted the difference between the photos and many expressed shock at the difference, making explicit comparisons between the two. The majority (n=57) of participants rated the aged photo as less desirable and none rejected the UV-aged photo as unrealistic or unlikely to occur. Participants compared the aged photos to images of ugliness such as witches or monsters. The negative comparisons were linked explicitly to behaviour change: ""Definitely (.) I don't wanna look like the man on the "Up" movie [a 78-year old computer animated man] like the old man (.) all wrinkly" (Chris, age 14) Participants used words such as "horrible" (n=26) and disgusting (n=20) to describe how they felt their faces looked with UV-ageing. They were concerned about wrinkling, spots and sagging. Participants said that viewing the photographs would have an effect on their future sun protection and/or UV exposure behaviours:

				"It's made me want to use more sun tan lotion…yeah like plaster it on you before you go to school!" (Bruce, age 11) Seeing the photos of their own faces was said to be helpful because they could relate to the photos. A number of the adolescents compared their faces to their parents or grandparents..

APPENDIX E

Quality Assessment Tables

Table E.1: Detailed Quality Assessment Table for Systematic Reviews

Author	Lorenc, 2010[15]	Garside, 2009[17]	Eagle, 2009[9]
Method of quality appraisal of included studies	All included studies were quality-assessed using the tool in Appendix H of the Methods for the development of NICE public health guidance (NICE 2009). This tool contains 12 questions which can be answered 'yes', 'no', or 'can't tell / not reported'. On the basis of the answers to these questions, each study was given an overall quality rating: (++), high quality; (+), medium quality; or (-), low quality.	NICE Methods Guidance was under review and therefore a different method was used based on Wallace, A., Croucher, K., Quilagars, D., & Baldwin, S. 2004, "Meeting the challenge: developing systematic reviewing in social policy", Policy and Politics, vol. 32, no. 4, pp. 455-470.	In the WMHTAC report quality assessment for included studies was conducted based on the NICE CPHE forms. In the Eagle 2009 report quality assessment for additional included studies was not reported.
Was an 'a priori' design provided?	Unclear. The study questions were reported 'a priori' but it is not clear when the study methods design (data synthesis and presentation) were provided.	Yes.	An 'a priori' design was reported in the original WMHTAC.
Was there duplicate study selection and data extraction?	Yes. All records were screened by two reviewers independently using the abstract inclusion checklist in Appendix B and any differences resolved by discussion and reference to a third reviewer if necessary.	Yes.	Titles and abstracts were screened. An independent assessor undertook a second screening of ten percent of articles in each database. Any discrepancies were discussed.One reviewer extracted data for each full paper. A second reviewer checked 10% of the data extraction tables for accuracy (100% for the cost-effectiveness review) and any differences were resolved by discussion.Checklists were applied by one reviewer to titles and abstracts in the appropriate database.
Was a comprehensive literature search performed?	Yes. Database sources and search strategies fully reported.	Yes. Database sources and search strategies fully reported.	Yes. The WMHTAC report descrbied database sources and search strategies.

Author	Lorenc, 2010[15]	Garside, 2009[17]	Eagle, 2009[9]
Was the status of publication (i.e. grey literature) used as an inclusion criterion?	No. In summary, the inclusion criteria were: Does the study address the research questions? Does the study present qualitative research? Was the study published in 1990 or later? Is the study published in English?	No.	No. This was not reported in the WMHTAC report.
Was a list of studies (included and excluded) provided?	Yes.	Yes.	Yes. The WMHTAC report provided lists of included and excluded studies.
Were the characteristics of the included studies provided?	Yes.	Yes.	Yes. The WMHTAC report provided tables of study characteristics. However, the report by Eagle 2009 did not.
Was the scientific quality of the included studies assessed and documented?	Yes. See cell AB5.	Yes.	Yes. The WMHTAC report quality assessed all included studies. However, Eagle 2009 included additional studies and did not assess their quality.
Was the scientific quality of the included studies used appropriately in formulating conclusions?	Yes. Quality rating for individual studies reported within the evidence statements.	Yes. Quality rating for individual studies reported within the evidence statements.	No. In the report by Eagle 2009 the conclusions did not take into consideration the quality of the included studies. Furthermore, the report by Eagle includes a section about factors known to impact on public health intervention effectiveness which references studies taken from a variety of sources and which have not been quality assessed.
Were the methods used to combine the findings of studies appropriate?	Yes.	Yes.	No. In the report by Eagle 2009 no justification for the methods used, is given.
Was the likelihood of publication bias assessed?	No.	No.	No. Was not reported in either report.

Author	Lorenc, 2010[15]	Garside, 2009[17]	Eagle, 2009[9]
Was the conflict of interest stated?	Yes. No authors had competing interests.	Yes. No authors had competing interests.	No. Was not stated in either report.
Quality score (++, + or -)	Good [++]	Good [++]	Moderate [+]
Comments	The authors report that the review was conducted in accordance with the second edition of Methods for the development of NICE public health guidance (NICE 2009).	This review had a clear focus and aims and objectives were set out at the outset *al*ong with study design. Methods were clearly described with quality assessments and data extraction included in appendices. Results were presented clearly and the conclusions made sense in light of the findings. Limitations of the review were made clear.	This report by Eagle was a synthesis of the findings from an earlier systematic review by West Midlands Health Technology Assessment Collaboration (Malottki *et al* 2009). Eagle included an additional 23 before and after studies that had been excluded from the report by Malottki *et al.* No quality assessment or data extraction was conducted for these additional studies. Eagle did not describe any methods used to develop the themes chosen for synthesising the findings data. The aims and objectives of the synthesis were not clearly stated. The conclusions were reported extremely briefly and no limitations of the synthesis methods or results were reported. Furthermore, the report introduced new material for Section 3 "Supplementary FActors" which was not systematically selected or quality assessed.

Table E.2: Detailed Quality Assessment Table for Qualitative Studies

Author		Williams, 2013[13], (Williams 2012), Williams, 2013b[20]	Curtis, 2009[19]	Cancer Research UK , 2008[28]	Cancer Research UK , 2008[29]
Theoretical approach	Is a qualitative approach appropriate?	Appropriate.	Appropriate.	Yes.	Yes.
	Is the study clear in what it seeks to do?	Clear.	Clear.	Unclear. Although the aims are clearly stated, no methods are reported.	Unclear. Although the aims are clearly stated, no methods are reported.
Study design	How defensible/rigorous is the research design/methodology?	Defensible. The study aimed to understand participants' experiences as they viewed the intervention, and the qualitative research enables the authors to gain a full and detailed picture of people's experiences through examining their accounts. However, the study did not justify the selection of cases. In the study in adolsecents the children were selected randomly.[20].	Defensible. The study method was chosen because it enables individuals to explore and compare other people's views and experiences with their own expanding the depth of their opinions. Focus groups were also considered to be appropriate for adolescents who might feel more comfortable discussing opinions with their peers in a familiar setting rather than taking part in an individual interview with the researcher	Not sure. No methods reported.	Not sure. No methods reported.
Data collection	How well was the data collection carried out?	Appropriately. Responses were recorded as the participants looked at	Appropriately. Responses were recorded during the sessions.	Not sure. Methods not reported.	Not sure. Methods not reported.

Author		Williams, 2013[13], (Williams 2012), Williams, 2013b[20]	Curtis, 2009[19]	Cancer Research UK , 2008[28]	Cancer Research UK , 2008[29]
		the images.			
Trustworthiness	Is the role of the researcher clearly described?	Unclear. The facilitator was female and thus it is not possible to determine from these data whether different accounts would result if the sessions were carried out by a male researcher.	Not described.	Not described.	Not described.
	Is the context clearly described?	Unclear. Only age and gender of the participants was reported. The children were 100% Caucasian.	Unclear. Only age and gender of the participants was reported. Observations not made in a variety of circumstances.	No. Age and gender of participants reported but no other aspects of the context described.	Unclear. The study reports results by gender, age and by social class.
	Were the methods reliable?	Reliable. Study collected data from individual interviews and focus groups. In the adults, and focus groups for the children.	Not sure. Study used only focus group method and did not justify lack of triangulating.	Not sure. No methods reported.	Not sure. No methods reported.
Analysis	Is the data analysis sufficiently rigorous?	Not sure. The authors report that they followed established psychology research methods (six phase process for inductive thematic analysis) but did not report	Not sure. The authors report in the methods that they identified supporting, contradictory and majority themes but did not report how exactly they did this.	Not reported.	Not reported.

Author		Williams, 2013[13], (Williams 2012), Williams, 2013b[20]	Curtis, 2009[19]	Cancer Research UK , 2008[28]	Cancer Research UK , 2008[29]
		how they did this.			
	Is the data 'rich'?	Not sure. This is a brief research report: very few characteristics of the participants are reported, it does however report on diversity of perspective and compares responses between both focus group and interview methods in the adult studies (focus groups only in the study involving children).	Not sure. Very few characteristics of the participants are reported, it does however report on diversity of perspective and explores contradictions in responses from individuals.	Not reported.	Not reported.
	Is the analysis reliable?	Not reported. Few details given about number of researchers or how differences in coding were resolved. In the study of female university students two researchers undertook the thematic analysis	Not reported. No details given about number of researchers or how differences in coding were resolved.	Not reported.	Not reported.
	Are the findings convincing?	Convincing.	Convincing.	Not sure. Cannot say because methods, analysis and results not described.	Not sure. Cannot say because methods, analysis and results not described.

Author		Williams, 2013[13], (Williams 2012), Williams, 2013b[20]	Curtis, 2009[19]	Cancer Research UK , 2008[28]	Cancer Research UK , 2008[29]
	Are the findings relevant to the aims of the study?	Relevant.	Relevant.	Relevant.	Relevant.
Conclusions	Is there adequate discussion of any limitations encountered?	Adequate.	Adequate.	Not reported.	Not reported.
Ethics	How clear and coherent is the reporting of ethics?	Not reported.	Appropriate.	Not reported.	Not reported.

Author		Williams, 2013[13], (Williams 2012), Williams, 2013b[20]	Curtis, 2009[19]	Cancer Research UK , 2008[28]	Cancer Research UK , 2008[29]
Overall assessment	As far as can be ascertained from the paper, how well was the study conducted?	This study had a clear focus with regard to study aims and underpinning theory. It included two different methods of data collection to ensure reliability. Results and discussion were appropriate according to the data presented. However, lack of reporting means that it is unclear how well data coding was conducted or how rigorous the data analysis was. There was little justification for the selection of participants and responses were not compared across groups or sites.	This study had a clear focus with regard study aims, underpinning theory and selected sample. Results and discussion were appropriate according to the data presented. Lack of reporting means that it is unclear how well data coding was conducted or how rigorous the data analysis was.	It is difficult to comment on how well this study was conducted as methods and analysis were not reported. The study lists the aims, briefly describes the participants and then goes on to list its findings in brief.	It is difficult to comment on how well this study was conducted as methods and analysis were not reported. The study lists the aims, briefly describes the participants and then goes on to list its findings in brief.
Quality score (++, + or -)		Poor [-]	Poor [-]	Poor [-]	Poor [-]

Table E.3 Detailed Quality Assessment Table for Questionnaires and Surveys

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
Did the study address a clearly focussed issue?	In terms of population studied?	No. The study did not specify a target population or use inclusion/exclusion criteria for the chosen sample. It simply refers to "a variety of patient groups".	No. The population of interest was not specified.	No. The study claimed to be interested in 'a sample of the population from Southwest England', however almost half of respondents were tourists.	Yes. Included construction workers from small, medium and large organisations.	Yes. Included adolescents aged 13-17.
	In terms of outcomes considered?	Yes	No. The report did not specify outcomes. It simply documented results from a household survey within which was a module on skin care knowledge and behaviours.	Unclear. The study aimed to measure awareness of the UVI index as it is used during weather forecasts and whether this caused individuals to change their sun protection behaviour. There is no indication that respondents were asked whether they had seen a relevant weather report (considering a large number were tourists). The authors do not state their outcomes a priori and present descriptive statistics	Yes. Specified data that would be collected and how it would be used to measure outcomes.	Yes. The authors specified data that would be collected and described how it would be used in regression analysis.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
	Are the aims of the study clearly stated?	Yes	No. The study simply aimed to document reported skin care knowledge and trends in sun care behaviours.	Yes. It aimed to explore awareness of and knowledge about the UVI presented to the public in weather forecasts	Yes.	Yes. Listed the study hypotheses to be tested.
Choice of study methods	Is the choice of study method appropriate (is justification for the study method given)?	Yes. The survey was meant to aid future sun-awareness aids.	Yes. It reports on results from a household survey within which a "care in the sun" module was included. No details are given about the questions that were asked.	Yes.	Yes. This was exploratory work and therefore correlations were used to assess associations between socio-demographic and occupational characteristics in relation to the use of sun safety measures.	Yes.
Is the population studied appropriate?	Were sampling techniques described?	No. It appears to be the case that everyone attending the practices aged ≥ 16 years were invited to complete a questionnaire. The study does not report the total number of people who were approached, or how many declined.	Yes. As part of the Omnibus survey n=2200 households were randomly selected each year (2000, 2004 and 2008). Response rates were 50% in 2000, 59% in 2004 and 55% in 2008. A total of n=3623 persons responded over the 8 year period.	Yes. A market research company was employed to undertake the interviews and to use quota sampling to recruit as follows: 50% male, 50% who lived in Devon or Cornwall and 50% on holiday from outside Devon and Cornwall; and 33% in each of the following age bands: 16–34, 35–54 and 55 years plus. Additionally, 33% of the sample was	Yes. A convenience sampling technique was used with data collected from a selection of small, medium and large companies known to the lead author.	Yes. A convenience sample of all children in years, nine, ten and twelve were invited to participate.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
				required to have school age children in the household.		
	Was the sample representative of its target population?	No. This was a convenience sample not a random sample.	Probably yes. There was an approximate 1.2:1 female to male ratio and slight over-representation of older age groups relative to the Northern Ireland population, with 52% of respondents in the 2008 survey aged ≥ 45 years, compared with 45% in the mid-year population estimate.	No. The sample was not intended to be a representative of a specific population. It was a convenience sample.	No. The companies were not representative of the sector in respect to its proportional composition of small, medium and large companies.	No. The sample included almost all British Caucasian adolescents from one school in Wales.
	Was the sample size justified?	No	No.	Yes. A power calculation (p = 0.05; population proportion = 0.5) indicated that a sample of 400 was required.	No.	No.
Is confounding and bias considered?	Have all possible explanations of the effects been considered?	Yes. All explanations of the effects have been considered and the limitations of the conclusions noted in the discussion.	No.	No. The country of origin for the tourists (46%) was not known. This may have had a significant bearing on their awareness or knowledge	Yes. All explanations of the effects have been considered and the limitations of the conclusions noted in the discussion.	Yes. All explanations of the effects have been considered and the limitations of the conclusions noted in the discussion.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
	Did the study achieve a good response rate?	Unclear. Study reports 1000 respondents but did not report number invited to take part.	Yes. Response rates were 50% in 2000, 59% in 2004 and 55% in 2008. A total of n=3623 persons responded over the 8 year period. See question 3.1.	Unclear. Study reports that n=400 was the required quota sample size and the study recruited n=466 participants. No information given on non-responders.	No. Response rate was 37%. 50% is considered an adequate response rate for a postal questionnaire. See comment attached to Q42.	Yes. Response rate was 89%.
	Were rigorous processes used to develop the questions? (E.g. were the questions piloted/ validated?)	No. The study does not report on the development of the survey tool. It does not consider illiteracy. It used a convenience sample.	Not reported.	Not reported. Questionnaire was based on those used in two previously published studies. The questionnaire consisted of 21 questions which included three about the participants' incidence of sunburn and use of sun protection behaviours; 13 about awareness and knowledge of the UVI; two about sun seeking behaviour; and three that related specifically to the UVI displayed by the UK Met Office.	Yes. Item design was informed by the existing literature on the use of sun safety measures among outdoor workers. The questionnaire was piloted to ensure its face validity prior to full administration.	Not reported.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
	Does the study measure what it intended to?	Yes, study aimed to identify current knowledge and awareness.	Not reported.	Yes.	Yes.	Yes.
Results	Are tables/graphs adequately labelled and understandable?	Yes.	No. Tables include data reported as percentages. Number of participants not reported as totals or by category.	Yes. Data presented in number form and percentages.	Yes.	Yes.
	Are you confident with the authors' choice and use of statistical methods, if employed?	Yes. Although mainly descriptive statistics presented. Fishers exact test was used to compare differences between groups.	Yes. Although mainly descriptive statistics presented. Statistical decisions with regard to differences in the proportions of respondents giving a particular answer to a question were conducted using z-tests which assume that any differences are normally distributed around zero.	Yes.	Yes. Odds ratios (OR) and 95% confidence intervals (CIs) were calculated using logistic regression for each of the sun safety measures that was significantly correlated (P , 0.05) with one or more socio-demographic or occupational characteristic.	Yes.
	Can the results be applied to the local situation?	Unclear. Study carried out in 3 practices: Oxfordshire (rural), central Oxford (urban) and central London (urban). Might not be generalisable to	No. Study carried out in Northern Ireland. No details given about ethnicity or skin types. No details reported for differences between respondents and non-	No. The study did not intend to be representative of a specific target population.	No. The companies were not representative of the sector in respect to its proportional composition of small, medium and large companies.	No. It cannot be assumed that the findings reported would be replicated in samples of adolescents from other ethnic groups or cultural contexts.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
		whole of UK (e.g differences in racial and socioeconomic background). Mostly women responded (67%).	respondents.			
Interpretation and discussion	Do the study results answer the original question?	Yes.	No original question was defined in this study.	Yes.	Yes.	Yes.
	Are limitations or weaknesses identified?	Yes. The study highlights some weaknesses. However, does not discuss response rate (not reported) or ability to read being a necessary criteria for taking part.	No.	No.	Yes.	It cannot be assumed that the findings reported would be replicated in samples of adolescents from other ethnic groups or cultural contexts.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
	Do the inferences/conclusions make sense?	Yes.	Unclear. Some conclusions seem to, but others assume reasons for respondants' actions which this type of study cannot claim. For example, Less frequent use of sunscreen among unemployed people (difference not significant) was thought to be caused by the cost of sunscreen.	Yes.	Yes.	Yes.
	Would you be able to replicate the study?	No. Don't have information on the questions asked or the number of patients invited to take part.	Unclear. Could replicate the sampling technique but no details given about the survey questions.	No. No details given of the survey questions or details of tourists who were approached.	Yes.	Probably yes. The methods section was very detailed.
Overall assessment	As far as can be ascertained from the paper, how well was the study conducted?	In terms of internal validity, the lack of reporting means the extent to which internal validity criteria were met is unclear. The study was focussed and clearly addressed a particular issue; the results and discussion were	Can't tell. Participants were selected at random. However, response rate to the survey was 55% and no details reported for differences between respondents and non-respondents. No details given of the questions that were	This study was not randomised. It used a convenience sample and the possibility of selection bias was not considered. Tourists made up 50% of the group and their country of origin or ethnicity is not reported. Questions	This was an exploratory study which was focussed and clearly addressed a particular issue. The results and discussion were appropriate according to the data presented although the study had a response rate	The study appears to have been well thought through with clear aims. The authors give detailed descriptions of outcomes to be measured and reasons for the analyses that were undertaken, although they did not describe

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
		appropriate according to the data presented. However, confounding and bias was not well addressed. In terms of external validity, it is unlikely this study can be applied to the general population; it was carried out in three general practices on a convenience sample predominantly of women.	asked or the justification for those questions. Survey results are reported as percentages and tables do not report the number of respondents. Therefore not possible to have confidence in difference in levels of knowledge over time.	were not reported and no details given of validation or reliability of the survey tools.	of only 37%. The study acknowledges the limitations of using a convenience sample rather than a random sample and the risk of response bias due to lack of information on non-responders. In terms of external validity, it is unlikely this study can be applied to the general population. It was carried out in the construction industry and included only men who worked outdoors. Furthermore, the study chose a selection of small, medium and large companies. However, these were not randomly selected, and it is possible that characteristics of participating organizations differed from non-participating organizations, limiting the generalizability of the findings to the	the questions or discuss any validation methods or piloting of the questionnaire. The sample was non-randomised and was selected from one school in a rural, coastal town in Wales in which almost all the sample was British Caucasian. Given that almost 98% of people in Wales are Caucasian (http://www.uwic.ac.uk/shss/dom/newweb/ethnic/Population.htm) this sample would probably be representative of the general population in Wales.

Author		Butler, 2013[5]	Gavin, 2012[6]	Morris, 2011[8]	Madgwick, 2011[11]	Mewse, 2011[16]
					sector.	
Quality score (++, + or -)		Poor [-]	Poor [-]	Poor [-]	Poor [-]	Moderate [+]

Table E.4: Detailed Quality Assessment Table for Questionnaires and Surveys (cont.)

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
Did the study address a clearly focussed issue?	In terms of population studied?	Yes. Inclusion criteria explicit.	No. Anyone who visited the website was invited to complete the survey. All those who responded were included in the analysis.	Yes.	No. No details given for including the study sample of 40 students.	No. The selected age range 15 to 34 was not clearly justified and furthermore older and younger people were included and then for purposes of analysis, were excluded.	Yes.
	In terms of outcomes considered?	Yes.	Yes.	Yes.	Yes.	Yes.	Yes
	Are the aims of the study clearly stated?	Yes.	Yes.	Yes.	Yes.	Yes.	Yes
Choice of study methods	Is the choice of study method appropriate (is justification for the study method given)?	Yes.	Yes.	Yes.	Yes.	No. A mix of quantitative and qualitative methods is used with no justification for either.	Yes

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
Is the population studied appropriate?	Were sampling techniques described?	Yes. Cluster sampling was used within a designated area in each of the two parks. Purposive sampling was then used to identify people within the park boundaries that met the selection criteria.n=50 were chosen from each of the parks totalling n=100 participants.	Yes. All respondents who completed the online questionnaire were included.	Yes. A convenience sample of leaflets from Brighton & Hove PCT area only.	No.	No.	Yes. South Hams, Teignbridge and West Devon were chosen to pilot the 'enhanced' campaign (along with Torbay), since they have the highest malignant melanoma rates in Devon..
	Was the sample representative of its target population?	No. This was a non-random sample. In addition, this group of participants was more privately schooled and completed more tertiary education than the figures shown for the public averages for this age	No. The sample included 79% women and most respondents were under 50 years. In addition, the survey was promoted through Cancer Research UK communication channels and was therefore	Unsure. The study did not discuss what leaflets might be available in other parts of the United Kingdom.	Unsure	No. No details given of the sample characteristics compared to characteristics of all students attending the college.	Unsure, 50% of invited pharmacies did not join the campaign.

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
		group.	likely to attract an audience with a personal interest in cancer,				
	Was the sample size justified?	Yes. A power calculation showed that n=120 participants were required, but due to limited resources and time the sample was reduced to n=100.	No.	No.	No. Therefore, while none of the apparent differences in thoughts elicited by the direct measure and the absolute peer risk measure achieved statistical significance, it is not clear whether there genuinely were no differences, or if the differences would become statistically significant with a larger sample.	No.	No
Is confounding and bias considered?	Have all possible explanations of the effects been considered?	Yes.	Yes.	Yes.	Yes.	Yes.	No

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
	Did the study achieve a good response rate?	Yes.	Unsure. The SunSmart website had approximately 20 000 monthly visitors over the summer period and n=2000 completed the online survey between May and Sept 2007.	Not reported.	Unsure.	No. The study met its target number of participants but it is not clear how many were invited to take part.	Unsure. 50% of invited pharmacies joined the campaign.
	Were rigorous processes used to develop the questions? (e.g. were the questions piloted/validated?)	Yes. The questions were piloted. Responses were validated by comparing responses between questions and checking for consistency.	Not reported.	Not relevant.	Unsure. Details of development of questions about skin cancer risk not reported.	Yes. Reported in the pilot project 2011. However, one question and the responses to it are reported even though the question did not appear in the questionnaire.	Unsure. Not reported.
	Does the study measure what it intended to?	Unsure. The authors set out to measure "knowledge of risk" but within the results section they simply state that "knowledge of risk is high" , without reporting	Yes.	Yes.	Yes.	Mostly. Although the authors accept that one question was wrongly worded yet the results were published anyway.	Yes.

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
		actual data.					
Results	Are tables/graphs adequately labelled and understandable?	No. Tables and graphs are somewhat confusing (reporting frequency and percentages but not number of participants).	Mostly. However, data in tables and figures reported in percentages only and no "n" values given.	Yes.	Yes.	No. Mostly the data are reported in percentages and it is not clear what numbers of participants have been included.	Yes.
	Are you confident with the authors' choice and use of statistical methods, if employed?	No. The authors report that "To test the results statistically chi-squared was used." However, no chi square values were reported. They also reported that "The correlation within the knowledge-based questions and attitude-based questions was tested." Results of these tests were not reported.	Yes.	Yes.	Yes.	No. The authors report that some of the changes between before and after are statistically significant but they do not report p values or describe the tests used.	Yes

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
	Can the results be applied to the local situation?	No. The findings reported could not necessarily be applied to samples of adolescents from other ethnic groups or cultural contexts.	No.	Unsure of how representative the leaflets are of those available in other pharmacies and general practices in the UK.	Unsure. The sample was not well described and was relatively small (n=40).	No. Apart from age, gender and skin type no other characteristics are reported and there is no information on the characteristics of the college students as a whole.	It is not clear how representative the pharmacies which volunteered are of all the pharmacies in the area.
Interpretation and discussion	Do the study results answer the original question?	Yes somewhat. Results are written up in an inconsistent manner with data presented for some outcomes but not for others.	Yes.	Yes.	Yes.	Yes.	Yes
	Are limitations or weaknesses identified?	Yes. The authors refer to the small sample size and the demographic characteristics of the sample, as well as recall difficulties with regard to what was learned at school re sun	Yes.	Yes.	Yes.	Yes.	Not in any detail in this report.

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
		protection.					
	Do the inferences/conclusions make sense?	Yes.	Yes.	Yes.	Yes.	Yes.	Yes although the discussion is quite sparse.
	Would you be able to replicate the study?	Possibly yes. The methods were detailed but sometimes lacking in clarity.	Unsure. Methods section is not comprehensive.	Yes.	Yes. Study methods are very clear.	Yes.	Possibly, if all the questionnaires were provided.
Overall assessment	**As far as can be ascertained from the paper, how well was the study conducted?**	The study aims were clear and the methods well described although not everything they set out to do was reported in the subsequent results section. Questions were piloted and responses for different questions cross checked with	The study was focussed and clearly addressed a particular issue with regard to outcomes but not population studied (only website visitors). Results and discussion were appropriate according to the data presented. In terms of	This is a well conducted study with clear objectives and outcomes. It assessed the quality of information leaflets on skin cancer and sun protection behaviours. Results and discussion were appropriate according to the	This was a small exploratory study which was focussed and clearly addressed a particular issue. The results and discussion were appropriate according to the data presented. However, the authors acknowledge that even though	This was an innovative study which was focussed and clearly described an appearance-based intervention. The results and discussion were appropriate according to the data presented. However, due to lack of reporting it was not clear	This was a clearly designed evaluation, but is rather undermined by its recruitment method. The reporting should be more detailed..

Author		Hedges, 2010[7]	Diffey, 2009[10]	Nicholls, 2009[30]	French, 2008[12]	Bird, 2011[14]	Bird, 2011[21]
		other responses to confirm consistency. This was a relatively small study (n=100 vs. a pre-specified sample of n=120) due to limited resources. The study chose a convenience sample of young people aged 18 to 28 years, British and Caucasian and as such they are not representative of the general population.	external validity, it is unlikely this study can be applied to the general population; the study used data from a convenience sample which comprised mostly women, younger people and who possibly were predisposed to having concerns about skin cancer risk.	data presented. In terms of external validity it is not clear how representative the leaflets are of those available in community pharmacies and general practices in the rest of the UK since the study used a convenience sample from one small geographical area.	the results indicate no apparent differences in thoughts elicited from a direct and indirect method, it is not certain that there are genuinely no differences due to the small sample size.	exactly how people were recruited and how many were included in the analysis. Presentation of results was unclear. In terms of external validity it is not clear how representative the study participants are of the college population as a whole.	
Quality score (++, + or -)		Poor [-]	Poor [-]	Moderate [+]	Moderate [+]+	Poor [-]	Poor [-]

APPENDIX F

PRISMA Table

Section/topic	#	Checklist item	Reported in section #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	NA; an Evidence Review
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Executive Summary
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1.1
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2.1.3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	NA
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2.1.2
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Appendix A
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix A
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	2.3 (and Appendix B)
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	2

Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Appendix A
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	2.5 (and Appendix F)
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	7

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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