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Effects of a photoaging appeal on sun protection attitudes of female adolescents

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Suzanna Papasavvas

Abstract

Millions of people purposefully and dangerously expose themselves to the sun with the aim of attaining tan, especially female adolescents who perceive a tan as attractive. The primary consequence of such exposure is skin cancer as well as premature ageing of the skin which is known as photoaging. Empirical evidence indicates that photoaging photography, which explicitly illustrates the ageing of skin through the use of a UV-filter, as well as photoaging information, contributes to the efficacy of appearance-based health promotion interventions which aim to increase sun protection intentions and behaviours. The present literature review indicates that the effectiveness of using this novel approach has not yet been explored in the Australian female adolescent population. The present paper reviews findings from empirical research concerning sun exposure practices of the Australian populace, the high skin cancer rates, motivators and intentions of deliberate sun exposure behaviours, age and gender differences, and the benefit of including photoaging information and photographs in health promotion campaigns, with particular focus on adolescent females. A consistent finding across many quantitative studies is that although many people show high levels of knowledge of the dangers of excessive sun exposure, this does not transfer into behaviour, with the desire for a tan far exceeding any concern for one's health, particularly in Australian adolescents. Current research shows, however, that by using fear appeals and vivid health promotion material, these messages personalise the threat of skin cancer and are more persuasive in producing response to skin cancer prevention. The presentation of photoaging photography and information has been found to increase behaviours and intentions to sun protect which holds promise as a way to further increase the success of health messages. This review concludes with an exploration of the implications of these findings.

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Effects of a Photoaging Appeal on Sun Protection Attitudes of Female Adolescents: A Review of the Literature

Skin cancer has been characterized as an undeclared epidemic (Martin, 1995) and is the most common of all cancers (MacKie, 1992), comprising half of all new cancers. Australia has the highest incidence of skin cancer in the world, with an estimated two of every three people expected to develop some type of skin cancer during their lifetimes (Giles, Marks, & Foles, 1988). With skin cancer so prevalent, the health community has attempted to increase public awareness and knowledge on the risks of exposure to ultraviolet (UV) radiation, through education and public health campaigns. Campaigns such as SunSmart and Slip! Slop! Slap! have been carried out by the Australian Cancer Council over the past two and a half decades with encouraging results. Borland, Hill, and Noy (1990), using a household telephone survey, found that the public's knowledge of sun exposure damage had increased significantly following the Slip Slop! Slap! and SunSmart campaigns. Past research, however, has found that despite an increase in the public's level of awareness of the dangers of overexposure, appropriate protective behaviours are not being practiced (Cockburn, Hennrikus, Scott, & Sanson-Fisher, 1989; Keesling & Freedman, 1987; Miller, Ashton, McHoskey, & Gimbel, 1990).

This review explores the prevalence, incidence, and causes of skin cancer with particular focus on Australia where skin cancer rates are exceptionally high. One consequence of excessive sun exposure is photoaging. Photoaging refers to premature wrinkling and age spots which result from long-term sun exposure and is characterized by wrinkles, xerosis (dryness), laxity, pigment alterations, and vascular changes in the skin (Weinstock, 1995). The use of photoaging images in campaigns directed at changing attitudes towards sun exposure will be explored, as these have been found to increase the

success of health campaigns (Mahler, Kulik, Gibbons, Gerrard, & Harrell, 2003; Mahler, Kulik, Harrell, Correa, Gibbons, & Gerrard, 2005). An analysis of motivations, trends, and sun protection follows, with particular reference to age and gender differences with a subsequent review of health promotion campaigns aimed at decreasing sun exposure. Finally, studies that have utilised fear-arousing warnings (including photoaging) are reviewed to assess the value of this strategy for future educational interventions and health campaigns. The primary purpose of this review is to explicate the novelty of photoaging as an innovative approach to increasing the effectiveness of health promotion and intervention.

Sun Exposure and Skin Cancer

All three major types of skin cancer (basal cell, squamous cell and melanoma) are caused by exposure to UV radiation, and specifically to prolonged and/or intermittent exposure to the sun (American Academy of Dermatology [AAD], 1996; American Cancer Society [ACS], 1996; Glass & Hoover, 1989; National Cancer Institute [NCI], 1995; Strange, 1995). A close link exists between non-melanoma skin cancers and cumulative UV exposure, while melanoma appears to be related to more intermittent, intense exposure (Gies, Roy, & Elliot, 1986; MacKie, 1992; Spencer & Amonette, 1995; Weinstock, 1995). Exposure to artificial sources of UV radiation such as solariums, are also a major risk factor (International Agency for Research on Cancer [IARC], 1992; McCarthy & Shaw, 1989).

The three most prevalent types of skin cancers are basal cell carcinoma, squamous cell carcinoma, and malignant melanoma (Vail-Smith & Felts, 1993). Melanoma is the most dangerous type of skin cancer occurring most frequently in people aged between 15

and 44 years (Australian Institute of Health and Welfare [AIHW], 2004). Basal cell cancer is the most common type, comprising 75% of all skin cancers and is formed in the lowest layer of the epidermis, the basal layer. Areas such as the head and neck are more vulnerable to basal cell carcinoma because of their increased sun exposure. Once an individual is diagnosed with this slow growing cancer, a second skin cancer is likely to develop within five years (American Cancer Society [ACS], 2000). Squamous cell cancers develop in higher levels of the epidermis and comprise about 20% of all skin cancers. This form of skin cancer is more aggressive than basal cell cancer and invades tissues beneath the skin (ACS, 2000). Malignant melanoma begins in the melanocytes, which produce the skin pigment (colouring) known as melanin. Comprising only 4% of all skin cancers, melanoma is the most dangerous, resulting in 79% of deaths from skin cancer (ACS, 2000). Melanoma incidence rates are the highest in Australia where no other form of cancer is increasing as fast with the incidence rising at a rate of 4% every year (ACS, 2000). Sun exposure is the cause of around 99% of non-melanoma skin cancers and 95% of melanoma in Australia (Armstrong, 2004).

The ozone layer has depleted in recent decades by the use of substances that upset the balance of chemical reactions taking place in the stratosphere. These substances include chlorofluorocarbons, halons, methyl chloroform, carbon tetrachloride, and methyl bromide which are used in refrigeration, dry cleaning, solvents, and fire extinguishers. There has been a 5% to 9% depletion of the ozone layer over Australia since the 1960s (Australian Government Department of the Environment and Heritage, 2003). This depletion of the stratospheric ozone has been associated with the increasing rates of skin cancer in the population (Cancer Council Australia, 2002). As gasses in the atmosphere increase, so does the danger of skin cancer due to the depletion of the ozone layer. The

rates of skin cancer among Australians are extreme in comparison to other parts of the world. This is because Australia is located close to the area of the ozone at which there has been more dramatic thinning: over the Antarctic region in which Australia is included (Agos, 2000). This means that much higher levels of UV radiation get through to ground level and on a continent which is mostly populated by light-skinned people of northern European descent (the group at highest risk for skin cancer), a population of avid beach-goers, and a culture which accommodates and encourages a multitude of outdoor activities: this is not good news.

UV radiation is a spectrum of light wavelengths ranging from 200–400 nanometres (Ohnaka, 1993) and exposure to UV radiation, through the exposure of skin to the sun, is recognised as the most dangerous factor associated with skin cancer risk in Australia. UV radiation is categorised into three types: ultraviolet A (UVA, 320–400 nm), ultraviolet B (UVB, 290–320 nm) and ultraviolet C (UVC, 200–290 nm). Although the most potent, UVC rays tend to be blocked by the ozone layer. UVB is the most potent UV light that reaches the earth's surface thus, posing the biggest threat for skin damage (including g photoaging) and causing most sunburn (National Health and Medical Research Council [NHMRC], 1996). The upper layer of the epidermis mainly absorbs shorter wavelength UVB radiation. Longer wavelength UVA radiation penetrates deeper into the dermis and weakens the skin's inner connective tissue (AAD, 1996; Gies et al., 1986).

Virtually all reported cases of skin cancer are among Caucasians (Clarke, Williams, & Arthey, 1997). Aborigines, African-Americans, and other darker-skinned groups are at a lower risk of developing skin cancer because their melanocytes, located in the epidermal layer of the skin, are able to produce more melanin than the melanocytes of Caucasians and this darker skin colour provides increased protection from exposure to

harmful UV radiation (Clarke et al., 1997). The risk of skin cancer is even greater among those who sunburn readily and tan poorly, namely those with red or blond hair and fair skin that freckles or burns easily (Scotto, Fears, Kraemer, & Fraumeni, 1996). Other strong predictors of melanoma include having a large number of moles; family history of melanoma; and increasing age (Goldstein & Tucker, 1995).

Although sun exposure has been related to good health (Randle, 1997), this seems to be a conviction of the past. Increasing skin cancer prevalence and research has shed light on this topic and perceptions of sun exposure are changing. Repeated exposure of normal skin to sources of UV radiation, deliberately or otherwise, through activities such as sun tanning and solarium use, has detrimental effects that include induction of skin cancer, changes in immune function, and photoaging (Guercio-Hauer, MacFarlane, & Deleo, 1994). The next section explores a consequence of excessive sun exposure: photoaging, which serves as a foundation for the examination of photoaging as an innovative approach to increasing the success of health campaigns which will be reviewed further on.

Photoaging

"Photoaging refers to the skin changes that take place over time from exposure to solar radiation" (Guercio-Hauer et al., 1994). The term describes distinct clinical, histological and functional features of chronically sun exposed skin (Berneburg, Plettenberg, & Krutmann, 2000) including a leathery appearance, increased wrinkle formation, reduced recoil capacity, increased fragility of the skin with blister formation (Scharffetter-Kochanek, 1997), and premature ageing of one's appearance which can be considerable in some cases. An accumulation of elastic material causes the increased

thickness of photoaged skin; chronologically aged skin is, by comparison, thinner and more atrophic (Oikarinen, 1990). The most striking histologic change of photodamage takes place in the dermis. The initially normal elastic fibres begin to undergo hyperplasia that progresses to a large accumulation of thickened, tangled fibres and degenerates into an amorphous mass of elastic material. This degree of elastosis is not seen in sun-protected skin, even in very elderly persons (Lober & Fenske, 1990).

Photoaging is a slow process, taking decades to become clinically apparent, but through the use of a UV-filtered camera these changes are visible by the naked eye. An appearance-based intervention has recently developed that uses this UV-filtered camera (Fulton, 1997). The camera's long wavelength of UV light shines deeply into the skin (3 millimetres) where it reacts with the melanin to reveal the normally invisible irregularities and damage caused by UV exposure. Chronic exposure accelerates photoaging and produces non-uniform epidermal pigmentation, which appears in the photo as dark blotches that are quite prominent and impactful (Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005). The implications that the utilisation of such exposure has with sun protection interventions will be explored in depth further on. First the age and gender differences in sun exposure and protection will be reviewed as these have been identified as factors that have an influence on sun protective behaviours (Arthey & Clarke, 1995).

Sun Tanning and Sun Protection

Skin cancer rates for young Australians have decreased in recent years. This is thought to be the result of public education campaigns about skin cancer and increasing awareness of the damaging effects of UV light (Cancer Council Australia, 2002), however, although Australian adolescents know the most about sun protection, they do

the least to protect themselves from the sun (SunSmart, 2003). One of the first large-scale studies of adolescents was conducted by Cockburn et al. (1989) with findings that were concerning. The results revealed that a substantial 70% of the Year 9 and 10 students were not taking adequate precautionary measures against sun exposure. Consistent with the lack of sun protection in Year 9 and 10 students found in Australia (Cockburn et al., 1989), results from a study of 220 American adolescents revealed that similarly, 33% reported never using sunscreen protection and only 9% of the participants acknowledged consistent sunscreen use (Banks, Silverman, Schwartz, & Tunnessen, 1992). In the same study, more than 80% of the participants reported spending most of their weekends exposed to the sun, and one third of the female participants reported tanning salon use.

Participants considered as high risk in relation to developing skin cancer, for example, those with fair skin or red hair were no more likely to take precautionary behaviours than other participants. The reported lack of precautionary behaviour coupled with the amount of time these students spent in the sun is indicative of an apparent disregard for skin cancer risks. Findings also showed significant positive relationships between current sunscreen use, being female, the presence of a close companion that used sunscreen protection, early life sunscreen protection due to parental instruction, and maximum sun exposure knowledge. This indicates that a sound knowledge of the risks involved with sun exposure, being a female, having friends who protect from the sun and the use of sunscreen from a young age lead to higher protection levels by adolescents. This has important implications for interventions: aiming education at large groups of female girls may increase sunscreen use due to peer norms, and educating parents on the significance of encouraging sun protection from a young age may also aid to decrease skin cancer incidence at a later stage in life.

A number of appearance-related barriers to effective sun protection have been identified in Australian adolescents and young adults. This demographic group has been shown to highly value and desire a suntan (Cockburn et al., 1989; Lowe, Balanda, Gillespie, Del Mar, & Gentle, 1993), are influenced by the belief that most of their friends value a suntan (Lowe et al., 1993), believe that it is worth considerable effort to obtain a suntan (Hill & White, 1992), believe it is more socially acceptable to have a suntan, see a suntan as both healthy and attractive (Broadstock, Borland, & Gason, 1992), and value a suntan over the benefits of sun protection (Pratt & Borland, 1994).

Age and Gender Differences. Despite increasing concerns about men's body image, women are undoubtedly the group that is most often judged according to standards of body ideals. Gender is the most important factor relevant for sun exposure with numerous studies confirming that women sunbathe to a higher extent than men do (Mawn & Fleischer, 1993; McGee & Williams, 1992; Melia & Bulman, 1995; Vail-Smith & Felts, 1993; Wichstrom, 1994) as well as a marked gender difference existing in relation to sun-protection and exposure behaviours; with females protecting more with sun screen but also intentionally exposing themselves by means of sunbathing or tanning salon use more than males (Banks et al., 1992). For women in Australia, favourable attitudes to sun-tanning, although in decline, are still prevalent (Hill & Boulter, 2002). A study confirming this was done by Lowe et al. (1993) in Queensland, Australia (N = 3655). Findings revealed that 40% of the secondary students in the study thought that taking effective precautions in the form of appropriate clothing was inconvenient. Females, in comparison to males, were more likely to believe that their friends liked to have a suntan and thought they looked better with a tan, felt better with a tan, and felt that

wearing a hat was unfashionable. Females also believed that their friends would disapprove if they used sun protection whilst tanning on the beach.

A study which aimed to further understand the beliefs connected with sun exposure precautionary behaviour was conducted by Hill and Rassaby (1984). They studied skin cancer precautionary behaviour among 150 Australian participants in an educational program. Findings revealed that the perceived effectiveness of sunscreens towards skin cancer prevention influenced precautionary behaviour. Females reported feeling more social pressures, positive attitudes, and positive intentions regarding sunscreen use than the males. In contention to these findings, more recent research has found that relative to males, females are 1.5 times more likely to intentionally tan than males despite being more aware of skin cancer information (Robinson, Rigel, & Amonette, 1997). Holman, Evans, Lumsden, and Armstrong (1984) suggest that the lower prevalence of sunscreen use among males compared with females may be because "males regard the application of a cream or lotion to the skin as being unmanly" (p. 421).

The perception of tanned skin as attractive is a noticeable trend in the literature. Individuals report that they and others are more attractive when they have a tan (Broadstock et al., 1992; Clarke et al., 1997). Broadstock et al. (1992) studied 191 secondary school students from five Australian schools about their perceptions of attractiveness and health in regards to levels of tan. Participants were questioned on their perceptions of attractiveness and health in reference to slides of models they were shown. The gender of the models, gender of the participants, tan levels (no tan, light, medium, dark tan), and attire (casual and swimwear) served as independent variables in the study. Results indicated that "medium" tan was considered the most attractive and most healthy condition, and "no tan" was ranked as the least attractive and least healthy condition.

Participants who wanted a dark tan ranked darker tans as more healthy and attractive for male models, swimwear models, and themselves. Male participants viewed dark tans as being more attractive.

Several studies have examined the relationship between age and sunbathing. A survey in 1999 found a curvilinear relationship between age and sunbathing (Boldeman, Branstrom, Dal, Kristjansson, Rodvall, & Jansson, 2001). Females were found to sunbathe the most in late teens with a peak at the age of 17–18 years, and males were found to sunbathe the most in early adulthood with a peak at the age of 19–20 years. Young people, in general, spend more time outdoors in the sun, and are less likely to engage in sun-protective behaviours (Hill & Boulter, 2002; Mermelstein & Riesenberg, 1992). Similarly, a study by Melia and Bulman (1995) found that young adults had a general lack of sunburn concern, high occurrences of sunburns, heightened desires for a tan, and favourable attitudes toward tanning. These findings illustrate the need by adolescents for further educational interventions in order to decrease this blasé attitude held by so many who expose themselves to the sun whilst knowing the dangers. This is not to say that adults are not in need of additional education on skin cancer and the risks associated with sun exposure. Results from a study of 1,600 Australian adults by Hill, Marks, Theobald, Borland, and Roy (1992) revealed that in excess of 75% of the participants reported that they spent 15 or more minutes sunbathing during high-risk UV exposure times, less than 25% reported sunscreen use, and only 45% of the sunscreen using participants actually used sunscreen with the recommended sun protection factor of 15+.

High exposure to the sun between the ages of 10 to 24 years of age has been shown to be a strong risk factor for the later development of melanoma (Cockburn et al.,

1989). The detrimental consequences that result from sun exposure in adolescents when compared to adulthood are severe (NHMRC, 1996) as target cells are not fully developed yet (Hill et al., 1992), but despite this group possessing knowledge about the implications of sun exposure (Arthey & Clarke, 1995), it is during this time that a rapid decline occurs in the number of adolescents using skin protection (NHMRC, 1996). It is the fashion trends and peer pressures which are accountable for this (Lower, Girgis, & Sanson-Fisher, 1998) so targeting education at adolescents is imperative for decreasing and possibly preventing the behaviours that promote skin cancer.

There has been a plateau of skin cancer incidence rates in Australia in people under the age of 55 years (Marks, 1999), but despite this it still remains a prominent health issue. Skin cancer places an enormous demand on the Australian health system and creates the largest financial burden of all cancers, with conservative estimates putting the monetary cost of skin cancer treatment at $170 to $175 million Australian dollars annually (Carter, Marks, & Hill, 1999; Lowe, Balanda, Stanton, & Gillespie, 1999). Intervention to decrease skin cancer incidence rates are therefore beneficial not only to the general population but to the Government too. Understanding what motivates people to purposefully expose themselves to UV radiation is fundamental in this line of psychological enquiry and the next section will explore this complexity further.

Motives for Tanning

As alluded to earlier, sunbathing is a risky behaviour that is perceived to produce positive qualities in the sunbather such as improving attractiveness (Beech, Sheehan, & Barraclough, 1996; Broadstock et al., 1992), being seen as 'fashionable' (Randle, 1997),

looking and feeling healthy and attractive (Keesling & Friedman, 1987; Broadstock et al., 1992) and a belief that it is easier to enjoy summer with a tan (Miller et al., 1990).

Fashion trends have contributed to tanning behaviour and the perception of tanned skin as attractive (Randle, 1997). In 18th Century New World and European society, skin paleness was revered and highly sought after. Trends started to shift in the fast times of the roaring 1920s, as slimness and sun tanning quickly became the craze, and continued into the 1940s with the invention of the first bikini. Post Industrial Revolution trends further reversed earlier stereotypical perceptions of tanning, as tanned individuals were often seen as wealthy, youthful, attractive, adventuresome, and having the leisure time to sunbathe (Keesling & Friedman, 1987; Randle, 1997; Swerdlow & Weinstock, 1998). Tanning continued to grow into the very fabric of our culture by the 1960s and 1970s, and is still a very popular activity today. The use of tanning beds is the newest trend in obtaining and maintaining a tan with 25 million individuals in North America (Swerdlow & Weinstock, 1998) and 290,000 individuals in Australia exposing themselves to UV radiation by using tanning beds each year (Cancer Council Australia, 2004).

Sun tanning is one strategy individuals use to attain greater attractiveness (Miller et al., 1990). The tanned body is strongly promoted as attractive in magazine advertisements and other media outlets. The positive association between a tanned body and attractiveness has been demonstrated in several recent studies (Broadstock et al., 1992; Keesling & Friedman, 1987; Miller et al., 1990; Vail-Smith & Felts, 1993; Wichstrom, 1994). In the Johnson and Lookingbill (1984) investigation, 72% of their 489 participants believed that tanned skin was more attractive than untanned skin. Similarly, Vail-Smith and Felts (1993) found 73% of 296 adolescents believed tanned skin to be more attractive than pale skin. Therefore, it is not surprising that sunbathers have been

found to be less concerned with their actual health than with the appearance of health (Broadstock, et al., 1992; Keesling & Freedman, 1987). Keesling and Friedman (1987) found that having a tan and sunbathing were closely related to the individual's social networking system. For these participants, owning a tan was associated with the presentation of an image of an attractive person. Thus, the desire to have a tanned body may relate more to an individual's concern with social opinion rather than to self-satisfaction with appearance, with the trend continuing in regard to gender. Males view dark tans as more attractive (Broadstock et al., 1992) and perhaps it is in response to this that females experience higher levels of subjective norms (social pressures) and intentionally tan significantly more than males (Hill & Rassaby, 1984).

Appearance-based interventions which use images that cause a visceral arousal in participants may be a more effective way to deal with this apparent lack of concern by sunbathers of their health. The next section reviews this specific area, and explores the prevention strategies and focus of mass media campaigns aimed at increasing protective measures against UV radiation.

Prevention and Intervention

Considering that most skin cancers can be prevented by consistently protecting the skin from the sun, it is obvious to note the positive impact that effective, consistent preventative behaviours would have for Australians. Prevention of skin cancer may be as simple as the intentional avoidance of sun exposure by a number of means. Recommendations by the National Cancer Institute (1995) include the avoidance of exposure to the midday sun, the use of protective clothing, and the use of the appropriate sun protection factor (SPF) sunscreen. A sunscreen with an SPF of 15 used regularly

during the first eighteen years of life could potentially reduce the risk of developing non-melanoma cancer by 78% (Stern, Weinstein, & Baker, 1986).

The literature emphasizes the considerable influence of UV radiation on the incidence of skin cancer and the superior skin cancer rates in Australia—the highest in the world (AIHW, 2004; Marks, 2000, 2002), have been recognized in the National Goals and Targets for Australia (Australian Bureau of Statistics, 1994), which recommends a reduction in exposure to sunlight for all age groups, especially for those people at high risk of skin cancer. This is primary prevention which is aimed at achieving a reduction in the risk factors for skin cancer, most notably sun exposure and sunburn (Borland et al., 1990; MacKie, 1992; Marks, 1999), through environmental changes, social changes and behavioural modification (Morris, McGee, & Bandaranayake, 1998; NHMRC, 1996). Primary prevention is one of two strategies aimed at reducing mortality and morbidity rates from melanoma and is better established than the second strategy of early detection.

In addressing the growing problem of skin cancer, prevention has generally taken the form of increasing public awareness of the dangers of excessive sunlight exposure and educating the public on ways to avoid overexposure (Foot, Girgis, Boyle, & Sanson-Fisher, 1993). One method of promoting preventative behaviour to combat the consequences of unprotected sun exposure has arisen in the form of health-related advertising campaigns promoted by the Australian Government and various health-related associations and government supported bodies. The Anti-Cancer Council of Victoria has been running a sun protection program for over 20 years called Slip! Slop! Slap! This public campaign began in 1980 and has been a widely noticed and remembered initiative. As well as this a number of initiatives have been undertaken to encourage Australians to reduce their exposure to the sun. These include an annual

National Skin Cancer Awareness Week, the establishment of the Victorian Health Promotion Foundation (VicHealth) and the launching in 1988 of the SunSmart Program. Efforts to promote safe practices have involved educational interventions aimed at increasing awareness of the dangers of excessive sun exposure and encourage protective measures such as wearing hats and sunscreen. Studies of younger children's sunbathing habits show that exposure to UV radiation during childhood and adolescence is more important than at any other time of life as it plays a role in the future development of skin cancer (Balanda, Stanton, Lowe, & Purdie, 1999; Livingston, White, Ugoni, & Borland, 2001; Whiteman, Whiteman, & Green, 2001). It is estimated that 50% of lifetime skin damage occurs by the age of 20 years (Castle, Skinner, & Hampson, 1999) therefore, aiming interventions at children and adolescents seems integral to taking control of the skin cancer epidemic and beginning a rapid decrease in skin cancer prevalence, especially in adulthood.

Health education programs that rely solely on increasing the public's level of knowledge are likely to have only limited success in changing behaviour (Jackson & Aiken, 2000) and research has confirmed this: what has been found is that although these education programs (such as the SunSmart campaign) have been effective in increasing knowledge of the effects of sun exposure on the skin, these high levels of knowledge are not translating into the adoption of appropriate behaviours (Cockburn at al., 1989; Keesling & Freedman, 1987; Miller et al., 1990) and this is a major obstacle in health promotion efforts. A reason for this may be the belief held by people that they are less susceptible to skin cancer than others; this is known as optimistic bias and has been demonstrated in relation to a wide range of health problems including lung cancer and asthma (Weinstein, 1982). Optimistic bias reduces the worry about a range of health

problems and therefore decreases the likelihood that people will take preventative actions (Weinstein, 1982) thus in the present context, even if one believes skin cancer is serious, that sun protective behaviours can prevent skin cancer, and that one is capable of performing sun protective behaviours, beliefs that one is not personally susceptible to skin cancer might well undermine enjoinders to reduce sun exposure. The decision to tan or not to tan is typically a controllable behaviour (Miller et al., 1990) and as such, could theoretically be largely preventable. Research has found that a significant number of individuals intentionally work on a tan (Johnson & Lookingbill, 1984) which has important implications for interventions.

A second major obstacle to effecting health behaviour change is the fact that the rewards of the maladaptive behaviour (in this case, tanning) are relatively immediate, whereas the potential benefits (e.g., prevention of skin cancer) of the adaptive recommended behaviour (e.g., sun protection) typically are at best realised in the distant future (Weinstein, 1988). Viewed from this perspective, the modest efficacy of interventions that have sought to educate people about the skin cancer risks of frequent sunbathing is not surprising (e.g., Cody & Lee, 1990; Miller et al., 1990; Robinson, 1990). Research with other high-risk cancer producing behaviours such as smoking also does not support the idea that simple information based interventions produce significant behavioural change (Beiner & Abrams, 1992; Rossi, 1989). This finding may be due in part to the fact that simply explaining the etiology and risks of skin cancer may not have enough of an impact to motivate people to action therefore it appears that a new approach to intervention is needed. Perhaps, if people were made to fear the health consequences associated with their behaviours, there would be a greater chance of changing attitudes, intentions, and ultimately behaviour regarding sun exposure.

Fear Appeals. One new approach to increasing the effectiveness of health communication is the inclusion of fear inducing material to encourage people to engage in precautionary behaviour. Fear is defined as a negatively valenced emotion, accompanied by a high level of arousal (Witte, 1992). Fear appeals present the consequences that individuals will experience unless they stop risky behaviour or start preventive behaviour and as such, constitute a fundamental element in health risk communication (Witte, 1994). As a result, fear appeals have been the most frequently used message tactic in public health campaigns advocating behaviour change (Freimuth, Hammond, Edgar, & Monahan, 1990). Fear appeals are persuasive messages that arouse fear (Witte & Allen, 2000) and have been used to address many of the most pressing public health issues including the cessation of smoking, the reduction of alcohol use while driving, exercise promotion and the use of sunscreen to prevent skin cancer. It is assumed that fear-arousing appeals will cause anxiety and feelings of threat, and that the recommended behaviour (in this case, the use of sun protection and avoidance of deliberate tanning) will be adopted in order to reduce the experienced anxiety and feelings of threat.

Much debate surrounds the question of how threatening a warning should be with some researchers arguing that each individual and circumstance has an optimal level of fear arousal to motivate change (Janis, 1984). Other researchers have argued that change as a result of a fear appeal depends directly on the stage of change in which it is presented (Cho & Salmon, 2006). More recently, research findings have shown that people who feel vulnerable to the health threat are more persuaded, experience more negative emotions, and have more favourable cognitive responses (Das, de Wit, & Stroebe, 2003). Although many perspectives exist on when to use fear appeals and the intensity which is

most effective, Witte and Allen (2000) concluded from a meta-analysis of nearly 50 years of research on fear appeals that strong fear appeals produce high levels of perceived severity and susceptibility, and are more persuasive than low or weak fear appeals which do not promote behaviour change. The next section reviews an innovative approach, based on the fear appeal, but which personalizes the potential risk of sun exposure on an individual's concern for their own attractiveness.

Implications of using Photoaging in Interventions

As the literature has shown, the majority of intentional UV exposure is directed at getting a tan to improve appearance (Broadstock, et al., 1992; Keesling & Friedman, 1987; Miller et al., 1990; Vail-Smith & Felts, 1993; Wichstrom, 1994) and it is for this reason that interventions that focus exclusively on the health risks of sun exposure may not be maximally effective. Several recent studies have demonstrated the promise of appearance-based interventions, which instead highlight the link between sun exposure and appearance detractors such as wrinkles, age spots, and uneven pigmentation, for motivating UV protection behaviours (Gibbons et al., 2005; Jackson & Aiken, 2000; Jones & Leary, 1994; Mahler et al., 2003). Compared with a health-based message, emphasizing negative appearance consequences may better counteract the primary (appearance-based) motivation for sun exposure, namely, getting a tan. Individuals may also feel more vulnerable to developing wrinkles and age spots than to cancer, because the former are more common and easily noticed. UV photography is a means which has been used in appearance-based interventions to highlight the negative appearance consequences of UV exposure.

Chronic UV exposure can produce uneven epidermal pigmentation as well as premature ageing that, when photographed through a UV filter, appears as brown blotches. This, as mentioned previously, is known as photoaging. Photoaging is revealed through a UV-filtered camera which uses long wavelengths of light to shine deeply into the skin and highlight the sun damage that would otherwise be hidden under the surface of "normal" looking skin. Viewing a photo of one's face with such blotches can be quite dramatic and may make the negative appearance consequences of sun exposure more salient, immediate, and certain. It is this 'shock' to the individual that often proves as the strongest tool to increase that individual's sun protection (Fulton, 1997). To date, the appearance-based interventions have produced promising results.

Results from an appearance-based sun-protective intervention study of 211 females aged 18–25 years showed immediate increases in sun-protective knowledge, beliefs in personal susceptibility to the deleterious effects of sun exposure and in the benefits of sun protection, with concomitant decreases in favorable attitudes to sun-bathing and intention to sunbathe (Jackson & Aiken, 2000). This study, although using an appearance-based framework did not use photoaging photography.

UV photography has been used in several recent appearance-based interventions to highlight the negative appearance consequences of UV exposure. In one such study, Mahler et al. (2003) tested college students and beachgoers to examine the effects that exposure to photoaging photographs of their own faces would have on participants' future intentions to use sunscreen. The UV photograph intervention significantly increased intentions in both the beachgoers and the college students to use sunscreen in the future. More specifically, sun protection intentions were greater if participants did versus did not view their UV photo. Limitations included the small sample sizes (n=68)

and the use of self-report measures which can be subject to overestimation and misjudgement. However, findings from a more recent and very similar study with college students confirmed the success of using photoaging photography previously found by Mahler et al. (2003): those who had versus had not viewed their UV photos reported less tanning booth use 3–4 weeks later (Gibbons et al., 2005).

These recent findings, although clearly promising, are limited to immediate intentions and self-reported behaviours over brief periods of time. In response to this Mahler, Kulik, Gerrard and Gibbons (2007) did a similar photoaging intervention as the research conducted by Mahler et al. (2003) but with the intention of observing longer-term effects of exposure to photoaging photographs on participants' future sun protection behaviours: the first 4–5 months after the intervention and following the period of greatest sun intensity, and then again in an unanticipated, 1-year post intervention assessment. What was found holds great promise for the future of skin cancer prevention and intervention: both interventions resulted in immediate positive effects on future sun protection intentions. At the 4–5 month (directly following the summer months) and the one year follow-up, both interventions showed objective evidence of less skin darkening, with those in the photoaging information condition also reporting more sun protective behaviour and continuing to show less skin darkening one year after intervention. Exposure to a photoaging video showed a significant increase in participants' immediate intentions to sun protect, reduced reported incidental sun exposure during the following year, increased self-reported sun protection behaviours that occurred during the summer months following the intervention, and, most importantly, produced spectrophotometric evidence of significantly less skin darkening at higher and lower exposure areas of the arm at the post summer follow-up and also a year after the original intervention.

To date, the dominant paradigm in health communication has involved using statistical evidence, probability, and appeals to logic and reason to persuade and motivate people to adopt behavioural changes. Increasingly, however, health communication developers are turning to narrative forms of communication like entertainment education (in such forms as DVD's or videos) and testimonials to help achieve those same objectives. Within the rapidly growing field of health communication, narrative approaches are emerging as a promising set of tools for motivating and supporting health-behaviour change (Hinyard & Kreuter, 2006).

The accumulating body of research on health-behaviour change and the use of photoaging photography although preliminary, is promising: by targeting interventions at the primary motivations for an action or behaviour (in this case the primary motivation is wanting to improve attractiveness so people get a tan), the future of the public's health may improve through the constant improvement through research and new findings of our health campaigns and warnings. Photoaging photography directly imposes the realization on people that behaviours that they practice, such as sun tanning, to increase or improve their physical appearance is in fact doing the exact opposite and it is this realization by people that acts as a more direct and immediate motivation for the use of protective measures. Health risks are made more threatening and personally relevant through exposure to photographs of one's own face which highlight accumulated sun damage (photoaging) and the research, although novel, confirming the benefits and success of photoaging photography has exciting implications for the future of health-behaviour interventions. The UV photographic intervention holds promise as a cost-effective approach to motivate practices that may ultimately result in health benefits (i.e., reduced skin cancer rates).

However, a gap exists in this area of psychological enquiry. Despite the vast amount of research carried out on skin cancer and skin cancer related interventions, there is a lack of intervention program research directed at adolescent females. An extensive literature review revealed that there has been no research carried out in Australia to assess the efficacy of photoaging photography as an intervention strategy with female adolescents. This is the demographic group that has been found to intentionally expose themselves to UV radiation the most (Banks et al., 1992). The primary reason underlying this behaviour is to improve one's physical appearance as research has found that a suntan is perceived as both healthy and attractive (Broadstock, et al., 1992). Interventions targeted at this group will prove beneficial in future skin cancer prevalence as females sunbathe the most in late teens with a peek at the age of 17–18 years (Boldeman et al., 2001) so implementation of effective skin cancer interventions before this age may facilitate a decrease in this trend. Additionally, as 50% of lifetime skin damage occurs by the age of 20 years (Castle et al., 1999), aiming interventions at children and adolescents seems integral to taking control of the skin cancer epidemic and beginning a rapid decrease in skin cancer prevalence, especially in adulthood.

There seems to be an element missing in current interventions and campaigns. Research has supported the positive effects on sun protection behaviours that the use of photoaging photography has yielded in appearance-based interventions (Gibbons et al., 2005; Mahler et al., 2003, 2005, 2007) by highlighting the negative appearance consequences of UV exposure therefore; incorporating this into interventions would increase the effectiveness of health promotion messages and prove beneficial.

With Australia having the highest incidence of skin cancer in the world, the degree to which health warning messages regarding skin cancer can be improved using

this innovative approach (photoaging photography) needs to be further explored, and a study examining the effect of employing a photoaging methodology on the attitudes of Australian female adolescents toward sun exposure would be extremely valuable.

Summary

Skin cancer is an important public health issue in Australia. This paper has reviewed the literature relating to sun exposure behaviours and practices as well as attitudes and beliefs underlying the motivations of deliberate UV exposure. The primary motivation underlying deliberate tanning is to improve physical attractiveness as an association exists between having a tan and looking and feeling healthy and attractive (Cody & Lee, 1990). The results of this field of psychological inquiry have significant implications for current and future generations of people who endanger themselves in pursuit of the iconic 'healthy' tan.

Effective, adequately implemented programs addressing sun protection have been shown to positively affect sun related knowledge, attitudes and behaviours. Presently, public awareness and knowledge of the dangers associated with exposure to UV radiation has increased dramatically due to wide-spread government campaigns through the media and through school educational programs with some success. Programs reducing sun exposure are most likely to be effective if they involve an element of fear-arousing material which in effect makes the threat of risky behaviour more personally relevant. Fear appeals have been found to increase compliance with disease prevention recommendations (Klohn & Rogers, 1991) and it is the utilisation of photoaging photography in interventions which has been found to cause this visceral reaction of fear.

Although it is a relatively new area of health promotion and disease prevention research, health promotion campaigns and interventions that emphasise the dramatic, physical damage caused by excessive UV exposure through the use of UV camera's have been found to increase the compliance of using sun protective measures (Mahler et al., 2003; Mahler et al., 2005). In conclusion, given that interventions for reducing UV exposure have aimed at increasing knowledge, and have shown inconsistent results with regard to resulting behaviour, the need to conduct methodologically sound research to further explore the effect that photoaging photography has on skin cancer interventions is valuable. The additional research conducted exploring the effect that the use of photoaging photography has in reducing dangerous, deliberate or otherwise motivated sun exposure in a demographic group which is most at risk of such behaviours (adolescent females) will add to the growing research in this area as well as to the improvement of future interventions.

References

Agos, F. (2000). Under The Layer: The depletion of the ozone drives sun-care sales in New Zealand and Australia. *Global Cosmetic Industry, 167,* 56.

American Academy of Dermatology. (1996). Melanoma/Skin cancer: You can recognize the signs. Evanston, Illinois: American Academy of Dermatology.

American Cancer Society. (1996). Cancer facts and figures-1996 [Brochure]. Atlanta, Georgia: American Cancer Society.

American Cancer Society. (2000). Skin Cancer (on-line). Available: www.cancer.org

Armstrong, B. K. (2004). How sun exposure causes skin cancer. In: D. Hill., J. M. Elwood & D. R. English, *Prevention of skin cancer*. Dordrecht: Kluwer Academic Publishers.

Arthey, S., & Clarke, V. A. (1995). Suntanning and sun protection: A review of the psychological literature. *Social Science and Medicine, 40,* 265–274.

Australian Bureau of Statistics. (1994). *Better Health Outcomes for Australians: National Goals, Targets and Strategies for Better Health Outcomes into the Next Century.* Canberra: Australian Government Printing Service.

Australian Institute of Health and Welfare and Australasian Association of Cancer Registries (2004). *Cancer in Australia 2001*, Canberra: AIHW (Cancer Series no. 28).

Australian Government Department of the Environment and Heritage. (2003). Australia's ozone protection strategy fact sheet – the ozone layer. Retrieved April 21, 2007: http://www.deh.gov.au/atmosphere/ozone/strategies/ozonelayer.html.

Balanda, K. P., Stanton, W. R., Lowe, J. B., & Purdie, J. (1999). Predictors of sun protective behaviours among school students. *Behavioural Medicine, 25*(1), 28–36.

Banks, B. A., Silverman, R. A., Schwartz, R. H., & Tunnessen, W.W. (1992). Attitudes of teenagers toward sun exposure and sunscreen use. *Pediatrics, 89,* 40–42.

Beech, J., Sheehan, E., & Barraclough, S. (1996). Attitudes toward health risks and sunbathing behaviour. *The Journal of Psychology, 130*(6), 669–677.

Beiner, L., & Abrams, D. B. (1992). The contemplation ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychology, 10,* 360–365.

Berneburg, M., Plettenberg, H., & Krutmann, J. (2000). Photoaging of human skin. *Photodermatology, Photoimmunology & Photomedicine, 16*(6), 239–244.

Boldeman, C., Branstrom, R., Dal, H., Kristjansson, S., Rodvall, Y., & Jansson, B. (2001). Tanning habits and sunburn in a Swedish population age 13–50 years. *European Journal of Cancer, 37,* 2441–2448.

Borland, R., Hill, D., & Noy, S. (1990). Being sunsmart: Changes in community awareness and reported beahvior following a primary prevention program for skin cancer control. *Behavior Change, 7,* 126–135.

Broadstock, M., Borland, R., & Gason, R. (1992). Effects of suntan on judgements of healthiness and attractiveness by adolescents. *Journal of Applied Social Psychology, 22,* 157–172.

Cancer Council Australia. (2002). *Skin Cancer in Australia.* Retrieved June 2, 2007: http://www.cancer.org.au/content.cfm?randid=960742.

Cancer Council Australia. (2004). *Cancer Council finds many Australians exposed by solariums*: A media Release. The Australasian College of Dermatologists. Retrieved July 2, 2007: http://www.cancer.org.au/documents/ 1DEC04 _TC CA_ solarium_alarm.pdf.

Carter, R., Marks, R., & Hill, D. (1999). Could a national skin cancer primary prevention campaign in Australia be worthwhile?: an economic perspective. *Health Promotion International, 14*(1), 73–82.

Castle, C. M., Skinner, T. C., & Hampson, S. E. (1999). Young women and sun-tanning: A cross-sectional study, and evaluation of a health education leaflet. *Psychology and Health, 14*(3), 517–527.

Cho, H., & Salmon, C. T. (2006). Fear Appeals for Individuals in Different Stages of Change: Intended and Unintended Effects and Implications on Public Health Campaigns. *Health Communication, 20*(1), 91–99.

Clarke, V. A., Williams, T., & Arthey, S. (1997). Skin Type and Optimistic Bias in Relation to the Sun Protection and Suntanning Behaviors of Young Adults. *Journal of Behavioral Medicine, 20*(2), 207–223.

Cockburn, J., Hennrikus, D., Scott, R., & Sanson-Fisher, R. (1989). Adolescent use of sun protection measures. *Medical Journal of Australia, 151,* 136–149.

Cody, R., & Lee, C. (1990). Behaviors, beliefs, and intentions in skin cancer prevention. *Journal of Behavioral Medicine, 13,* 373–389.

Das, E. H., de Wit, J. B., & Stroebe, W. (2003). Fear Appeals Motivate Acceptance of Action Recommendations: Evidence for a Positive Bias in the Processing of Persuasive Messages. *Personality and Social Psychology Bulletin, 29*(5), 650–664.

Foot, G., Girgis, A., Boyle, C. A., & Sanson-Fisher, R. W. (1993). Solar protection behaviours: A study of beachgoers. *Australian Journal of Public Health, 17,* 209–214.

Freimuth, V. S., Hammond, S. L., Edgar, T., & Monahan, J. L. (1990). Reaching those at risk: A content analytic study of AIDS PSA's. *Communication Research, 17,* 775–791.

Fulton, J. E. (1997). Utilising the ultraviolet (UV) detect camera to enhance the appearance of photo damage and other skin conditions. *Dermatologic Surgery, 23,* 163–169.

Gibbons, F. X., Gerrard, M., Lane, D. J., Mahler, H. M., & Kulik, J. A. (2005). Using UV photography to reduce use of tanning booths: A test of cognitive mediation. *Health Psychology, 24,* 358–363.

Gies, H. P., Roy, R., & Elliot, G. (1986). Artificial sun tanning: Spectral irradiance and hazard evaluation of ultraviolet sources. *Health Physics, 50,* 691–703.

Giles, G. G., Marks, R., & Foles, O. (1988). Incidence of non-melanocytic skin cancer treated in Australia. *British Journal of Medicine, 296,* 13.

Glass, A., & Hoover, R. (1989). The emerging epidemic of melanoma and squamous cell skin cancer. *Journal of the American Medical Association, 262*, 2097–2100.

Goldstein, A. M., & Tucker, M. A. (1995). Genetic epidemiology of familial melanoma. *Dermatologic Clinics, 13*(3), 605–12.

Guercio-Hauer, C., MacFarlane, D. F., & Deleo, V. A. (1994). Photodamage, photoaging and photoprotection of the skin. *American Family Physician, 50,* 337–332.

Hill, D., & Rassaby, J. (1984). Determinants of intentions to take precautions against skin cancer. *Community Health Studies, 7,* 33–44.

Hill, D., Marks, V., Theobald, T, Borland, R., & Roy, C. (1992). Melanoma prevention: Behavioral and nonbehavioral factors in sunburn among an Australian urban population. *Preventative Medicine, 21,* 654–669.

Hill, D., & White, V. (1992). Melanoma prevention: Behavioral and nonbehaviora factors in sunburn among an Australian urban population. *Preventive Medicine, 21,* 654–669.

Hill, D., & Boulter, J. (2002). *Sun protection behaviour: Determinants and trends.* Retrieved June 26, 2007:http://home.vicnet.net.au/~menzies/hilltxt.htm

Hinyard, L., & Kreuter, M. W. (2006). Using narrative communication as a tool for health behavior change: A conceptual, theoretical, and empirical overview. *Health Education and Behavior* (In press).

Holman, C., Evans, P., Lumsden, G., & Armstrong, B. (1984). The determinants of actinic skin damage: problems of confounding among environmental and constitutional variables. *American Journal of Epidemiology, 120*(3), 414–422.

International Agency for Research on Cancer (IARC), (1992). Solar and ultraviolet radiation. *IARC Monograph Evaluating Carcinog Risks to Humans, 55,* 1–36.

Jackson, K. M., & Aiken, L. S. (2000). A psychosocial model of sun protection and sunbathing in young women: The impact of health beliefs, attitudes, norms, and self-efficacy for sun protection. *Health Psychology, 19*(5), 469–478.

Janis, I. L. (1984). The patient as a decision maker. In W. D. Gentry (Ed.). *Handbook of Behavioural Medicine* (pp. 105–127). New York: Guilford.

Johnson, E. Y., & Lookingbill, D. P. (1984). Sunscreen use and sun exposure. *Archives of Dermatology, 120,* 727–731.

Jones, J. L., & Leary, M. R. (1994). Effects of appearance-based admonitions against sun exposure on tanning intentions in young adults. *Health Psychology, 13,* 86–90.

Keesling, B., & Friedman, H.S. (1987). Psychosocial factors in sunbathing and sunscreen use. *Health Psychology, 6,* 477–493.

Klohn, L. S., & Rogers, R. W. (1991). Dimensions of the severity of a health threat: the persuasive effects of visibility, time of onset, and rate of onset on young women's intentions to prevent osteoporosis. *Health Psychology, 10,* 323–329.

Livingston, P. M., White, V. M., Ugoni, A. M., & Borland, R. (2001). Knowledge, attitudes and self-care practices related to sun protection among secondary students in Australia. *Health Education Research, 16*(3), 269–278.

Lober, C. W., & Fenske, N. A. (1990). Photoaging and the skin: differentiation and clinical response. *Geriatrics, 45*(4), 36–40, 42.

Lowe, J. B., Balanda, K. P., Gillespie, A. M., Del Mar, C. B., & Gentle, A. F. (1993). Sun-related attitudes and beliefs among Queensland school children. *Australian Journal of Public Health, 17,* 202–208.

Lowe, J. B., Balanda, K. P., Stanton, W. R., & Gillespie, A. (1999). Evaluation of a three year school based intervention to increase adolescent sun protection. *Health Education and Behavior, 26*(3), 396–408.

Lower, T., Girgis, A., & Sanson-Fisher, R. (1998). The prevalence and predictors of solar protection use among adolescents. *Preventive Medicine, 27,* 391–399.

MacKie, R. (1992). Screening for skin cancer. *Occupational Health,* July 202–206.

Mahler, H. M., Kulik, J. A., Gibbons, F. X., Gerrard, M., & Harrell, J. (2003). Effects of appearance-based interventions on sun protection intentions and self-reported behaviors. *Health Psychology, 22,* 199–209.

Mahler, H. M., Kulik, J. A., Harrell, J., Correa, A., Gibbons, F. X., & Gerrard, M. (2005). Effects of UV photographs, photoaging information, and use of sunless tanning lotion on sun protection behaviors. *Archives of Dermatology, 141,* 373–380.

Mahler, H. M., Kulik, J. A., Gerrard, M., & Gibbons, F. X. (2007). Long-Term Effects of Appearance-Based Interventions on Sun Protection Behaviors. *Health Psychology, 26*(3), 350–360.

Mawn, V. B., & Fleischer, A. B., Jr. (1993). A survey of attitudes, beliefs, and behavior regarding tanning bed use, sunbathing, and sunscreen use. *Journal of the American Academy of Dermatology, 29*(6), 959–962.

Marks, R. (1999). Two decades of the public health approach to skin cancer control in Australia: Why, how and where are we now? *Australasian Journal of Dermatology, 40,* 1–5.

Marks, R. (2000). Epidemiology of melanoma. *Clinical and Experimental Dermatology, 25,* 459–463.

Marks, R. (2002). The changing incidence and mortality of melanoma in Australia. *Recent Results in Cancer Research, 160,* 113–121.

Martin, R. H. (1995). Relationship between risk factors, knowledge, and preventive behaviour relevant to skin cancer in general practice patients in South Australia. *British Journal of General Practice, 45,* 365–367.

Melia, J., & Bulman, A. (1995). Sunburn and tanning in a British population. *Journal of Public Health Medicine, 17,* 223–229.

Mermelstein, R. J., & Riesenberg, L. A. (1992). Changing knowledge and attitudes about skin cancer risk factors in adolescents. *Health Psychology, 11*(6), 371–376.

Miller, A. G., Ashton, W. A., McHoskey, J. W., & Gimbel, J. (1990). What price attractiveness? Stereotype and risk factors in suntanning behavior. *Journal of Applied Social Psychology, 20,* 1272–1300.

McCarthy, W., & Shaw, H. (1989). Skin cancer in Australia. *Medical Journal of Australia, 150,* 469–470.

McGee, R., & Williams, S. (1992). Adolescence and sun protection. *New Zealand Medical Journal, 105,* 401–403.

Morris, J., McGee, R., & Bandaranayake, M. (1998). Sun protection behaviours and the predictors of sunburn in young children. *Journal of Pediatric and Child Health, 34,* 557–562.

National Cancer Institute. (1995). What You Need to Know About Skin Cancer (NIH Publications No. 95–1564). Bethesda, M. D.: Author.

National Health and Medical Research Council. (1996). *Primary Prevention of Skin Cancer in Australia.* Report of the Sun Protection Working Party. NHMRC, Canberra.

Ohnaka, T. (1993). Health Effects of ultraviolet radiation. *Annual Physiological Anthropology, 12,* 1–10.

Oikarinen, A. (1990). The aging of the skin: chronoaging versus photoaging. *Photodermatology, Photoimmunology and Photomedicine, 10*, 47–52.

Pratt, K., & Borland, R. (1994). Predictors of sun protection among adolescents at the beach. *Australian Psychologist, 29,* 135–139.

Randle, H.W. (1997) Suntanning: Differences in perceptions throughout history. *Mayo Clinic Proceedings, 72,* 461–466.

Robinson, J. K. (1990). Behavior modification obtained by sun protection education coupled with removal of a skin cancer. *Archives of Dermatology, 126,* 477–481.

Robinson, J. K., Rigel, D. S., & Amonette, R. A. (1997). Trends in sun exposure knowledge, attitudes, and behaviors: 1986 to 1996. *Journal of the American Academy of Dermatology, 37,* 179–186.

Rossi, J. S. (1989). Exploring behavioural approaches to U.V. risk reduction. In Moshell, A., & Blankenbaker, L. W. (Eds.), *Sunlight, Ultraviolet Radiation, and the Skin,* National Institutes of Health, Bethesda, MD, pp.91–93.

Scharffetter-Kochanek, K. (1997). Photoaging of the connective tissue of skin: its prevention and therapy. *Advances in Pharmacology, 38,* 639–655.

Scotto, J., Fears, T. R., Kraemer, K. H, & Fraumeni, J. F. (1996). Nonmelanoma skin cancer. In: D. Schottenfeld & J. F. Fraumeni (Eds.), *Cancer epidemiology and prevention.* 2nd ed. (pp. 1313–1330). New York: Oxford University Press.

Spencer, J. M., & Amonette, R. A. (1995). Indoor tanning: Risks, benefits, and future trends. *Journal of the American Academy of Dermatology, 33,* 288–298.

Strange, C.J. (1995). Thwarting skin cancer with sun sense. *Food and Drug Administration Consumer, 29,* 10–14.

Stern, R. S., Weinstein, M.C., & Baker, S. G. (1986). Risk reduction for nonmelanoma skin cancer with childhood sunscreen use. *Archives of Dermatology, 122,* 537–545.

SunSmart. (2003). *Tans, Solariums and Faking it.* Anti-Cancer Council of Victoria. Retrieved June 2, 2007: http://www.sunsmart.com.au/s/schools/st_tans.htm.

Swerdlow, A.J., & Weinstock, M.A. (1998). Do tanning lamps cause melanoma? An epidemiologic assessment. *Journal of the American Academy of Dermatology, 38,* 89–98.

Vail-Smith, K., & Felts, W. M. (1993). Sunbathing: College students' knowledge, attitudes, and perceptions of risk. *College Health, 42,* 21–26.

Weinstein, N. D. (1982). Unrealistic optimism about susceptibility to health problems. *Journal of Behavioural Medicine, 5,* 441–450.

Weinstein, N. D. (1988). The precaution adoption process. *Health Psychology, 7,* 355–386.

Weinstock, M.A. (1995). Overview of Ultraviolet Radiation and Cancer: What is the link? How are we doing? *Environmental Health Perspectives, 103,* 251–254.

Whiteman, D. C., Whiteman, C. A., & Green, A. C. (2001). Childhood sun exposure as a risk factor for melanoma: a systematic review of epidemiologic studies. *Cancer Causes Control, 12,* 69–82.

Wichstrom, L. (1994). Predictors of Norwegian adolescents' sunbathing and use of sunscreen. *Health Psychology, 13,* 412–420.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59,* 329–349.

Witte, K. (1994). Generating effective risk messages: How scary should your risk communication be? *Communication Yearbook, 18,* 229–254.

Witte, K., & Allen, M. (2000). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education and Behaviour, 27,* 591–615.

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Effects of a Photoaging Appeal on Sun Protection Attitudes of Female Adolescents

Suzanna Papasavvas

Abstract

Despite health promotion efforts, health-risk behaviour is still prevalent, especially in female adolescents who purposefully expose themselves to the sun with the aim of getting a tan. The primary motivator of tanning has been found to be appearance-related, as tanned skin is perceived as attractive. Contemporary skin cancer interventions have focused on making the negative appearance consequences of sun exposure more salient through photoaging photography and this approach has been found to be more effective at increasing the adoption of appropriate sun-protective behaviours. The present study examines the effectiveness of a photoaging intervention on attitudes toward sun protection of a female adolescent population. A sample of 66 females aged between 15 and 17 years were randomly assigned to either the photoaging intervention or the educational intervention. The photoaging intervention included photoaging images and information whereas the education intervention did not. The intervention produced significant differences in attitudes across conditions favouring photoaging as an effective strategy for motivating sun protection practices that may reduce skin cancer risk.

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Effects of a Photoaging Appeal on Sun Protection Attitudes of Female Adolescents

Australia has the highest skin cancer rates in the world with the incidence continuing to rise by about 5% each year (NHMRC, 1996). The depletion of the stratospheric ozone combined with a population made-up of light-skinned people of northern European descent, an outdoor culture of avid beach-goers and the warm, dry climate, leads to Australians' high prevalence of skin cancer with an estimated 50% of Australians experiencing at least one skin cancer in their lifetime (Foot, Girgis, Boyle, & Sanson-Fisher, 1993).

As well as the threat of skin cancer, photoaging is also a significant risk of sun exposure. Photoaging, although not visible until later on in life, actually begins in a person's 20s and is defined as the premature ageing of the skin due to excessive sun exposure (Taylor, Stern, & Leyden, 1990). Sun exposure poses a threat to the exact thing that motivates it: appearance. Photoaged skin becomes course and atrophied, with an individual who has photoaged skin looking considerably older than their age (Guerico-Hauer, MacFarlane, & Deleo, 1994). Research has shown that presenting images of photoaging may be an effective tool in increasing compliance to sun protect when included in health promotion interventions (Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005; Mahler, Kulik, Gibbons, Gerrard, & Harrell, 2003; Mahler, Kulik, Gerrard, & Gibbons 2007).

To date in Australia, no studies have incorporated this novel strategy (i.e., photoaging) in sun protection interventions aimed at adolescent females: a very vulnerable population. This study explored the implications that photoaging information and images would have on female adolescent attitudes toward sun exposure and

protection to test the use of photoaging as a strategy to decrease dangerous sun exposure practices. Understanding what motivates people to purposefully expose themselves to UV radiation is fundamental in this line of psychological enquiry and the next section will explore this complexity further.

Tanning Trends and Motivators

Based on the current positive appeal of tanning in society, it is not surprising that tanning is significantly correlated with measures of attractiveness and good health (Broadstock, Borland, & Gason, 1992; Leary & Jones, 1993; Robinson, Rigel, & Amonette, 1997). Past research has in fact found that in Western society, Caucasian people with tanned skin are perceived more positively than those with pale skin (Broadstock et al., 1992). Many people think (possibly not incorrectly) that having a tan endows them with a more positive social impression (Leary, Tchividijian, & Kraxberger, 1994). The desire for a tan is driven by self-presentational needs of the individual and the image norms represented in the media. Thus, people who have higher needs to enhance others' impressions of them may be more influenced by image norms and, therefore, be more inclined to engage in a risky behaviour (Leary et al., 1994): adolescents are one such group.

Health-risk behaviour is common among all ages but in regards to sun exposure, adolescence is a time in which there is an elevation of deliberate sun exposure behaviours (Hill & Boulter, 2002; Mermelstein & Riesenberg, 1992). Young people, in general, spend more time outdoors in the sun, and are less likely to engage in sun-protective behaviours despite having knowledge of the dangers associated with sun exposure (Mermelstein & Riesenberg, 1992). Epidemiological evidence implicates sun exposure

during childhood and adolescence as the most detrimental factor in the development of skin cancer in later life (Buller & Borland, 1999; Hill & Dixon, 1999). In addition to this, 50% of lifetime skin damage occurs by the age of 20 years (Castle, Skinner, & Hampson, 1999) so adolescence is an important developmental period at which to target strategies aimed at reducing sun exposure (Livingstone, White, Ugoni, & Borland, 2001).

Although men may also place value in having a tan, research shows that across different countries, females are more likely to deliberately engage in suntanning and have a more positive attitude towards deliberately trying to gain a tan (Eiser, Eiser, & Pauwels, 1993; Eiser, Eiser, Sani, Sell, & Casas, 1995). Research has found that females are 1.5 times more likely than males to deliberately tan (Robinson et al., 1997) corroborating the alarming rise in Australian female melanoma-related deaths (AIHW, 2000).

Despite increasing concerns about men's body image, women are undoubtedly the group that is most often judged according to standards of body ideals. The pressure to conform to social norms is exacerbated for females (Hill & Rassaby, 1984) causing an increased concern about their social image. Social influence plays a prominent role in many health risk behaviours (Gibbons & Gerrard, 1997), for example, tanning, and it is adolescents who believe that others are preoccupied with their behaviour and appearance (Goosens, 1984) giving cause to the social pressures experienced and thus, the execution of risky behaviours, such as tanning, in an attempt to appear to others in a way believed to be attractive.

Gibbons and Gerrard (1997) found that adolescents perform much of their risk behaviour in front of, and for the benefit of their peers. This was evident in an Australian study of secondary school students (aged between 13 and 18) in which adolescent females, in comparison to adolescent males, were more likely to believe that their friends

liked to have a suntan and thought they looked better with a tan, felt better with a tan, and felt that wearing a hat was unfashionable. Females also believed that their friends would disapprove if they used sun protection whilst tanning on the beach (Lowe, Balanda, Gillespie, Del Mar, & Gentle, 1993). This holds important implications for interventions; if the attitudes toward sun protection of adolescents as a group were altered, this may decrease the trend of tanning and increase the use of sun protection. What challenges this then, is the tanned body being promoted as attractive in magazines and other media outlets: this seems the culprit in encouraging the perception of tanned skin as attractive through conditioning, thus leading to efforts by people and in particular, adolescent females, to achieve this image. The implementation of more effective health promotion strategies may help to disabuse this image of tanned skin as attractive.

Health Promotion

Unlike many other types of cancer, the cause of skin cancer is known. Ultraviolet (UV) radiation, through sun exposure or the use of tanning beds is implicated in over 80% of all skin cancers (Parker, Tong, Bolden, & Wingo, 1997). The decision to tan or not to tan is typically a controllable behaviour and as such, skin cancer is largely preventable (Miller, Ashton, McHoskey, & Gimbel, 1990). Past health promotion efforts have met limited success with researchers realising that increased knowledge regarding risk factors for sun exposure (e.g., skin cancer) does not, and has not, been a definitive precursor of behavioural change (Jackson & Aiken, 2000). Although health education programs such as the SunSmart campaign have been successful at increasing the public's knowledge and awareness of the risks involved with sun exposure, this knowledge has not been found to then translate into the adoption of appropriate sun-protective

behaviours (Cockburn, Hennrikus, Scott, & Sanson-Fisher, 1989; Keesling & Friedman, 1987; Miller et al., 1990) acting as a major obstacle in health promotion efforts. A more effective intervention method is necessary. As appearance enhancement acts as the primary motivation for intentional UV exposure (Broadstock, Borland, & Gason, 1992; Keesling & Friedman, 1987; Miller et al., 1990), the use of appearance-based interventions may yield higher rates in the adoption of appropriate sun safe practices. One such appearance-based intervention involves the use of photoaging images to dissuade people from practicing health-risk behaviours such as tanning.

Aside from the potential formation of skin cancer, additional negative effects of excessive sun exposure include photoaging. Photoaging (premature ageing of the skin) occurs as a direct consequence of sun exposure (Berneburg, Plettenburg, & Krutmann, 2000) resulting in skin taking on a leathery appearance, an increase in wrinkle formation, a reduction in the skin's capacity to recoil, increased fragility (Scharffetter-Kochanek, 1997), and alterations of pigmentation (Gilchrest & Rogers, 1993). The use of UV-filtered photographs has positively impacted the frequency of sun screen usage by highlighting photoaged skin which, to the naked eye appears normal, but under UV light shows the cumulative effects of the sun (Gibbons et al., 2005; Jackson & Aiken, 2000; Leary & Jones, 1994; Mahler et al., 2003).

Sun protection interventions have previously focused on educating people about the health risks of UV exposure unfortunately, these have not been very successful at increasing health-protective behaviour (Cockburn at al., 1989; Keesling & Freedman, 1987; Miller et al., 1990) whereas using photoaging photographs focuses on the already present negative appearance consequences of sun exposure and has been more successful at increasing sun-safe practices (Gibbons et al., 2005; Mahler et al., 2003; Mahler, Kulik,

Gerrard, & Gibbons, 2007). Fulton (1997) concluded that it is the shock tactic or vividness of the personalised photoaged picture that results in fear being a prominent reaction of participants which has been found to then motivate behaviour change (Gibbons et al., 2005; Mahler et al., 2003, 2007). For example, Gibbons et al. (2005) studied the effect of using UV photographs on participants' use of solariums and found that those who had viewed the photographs reported less solarium use than those who had not.

Photoaging as an Appearance-Based Intervention

Interventions that utilize photoaging to promote sun-safety have shown promising results for short term (Gibbons et al., 2005; Mahler et al., 2003) and longer term (Mahler et al., 2007) behaviour change. Preliminary examinations of the potential impact of UV photography and UV knowledge suggest that appearance-based interventions have the potential for motivating practices that result in health benefits (i.e., reduced cancer rates). The use of photographs to determine skin damage is an appearance-based intervention that utilizes the fear appeal approach. As the primary motivation for tanning is appearance enhancement (Leary & Jones, 1993; Miller et al., 1990; Robinson et al., 1997), interventions that emphasize the negative appearance consequences of tanning may be more effective than previous campaigns which have aimed to increase awareness and knowledge of the dangers involved (Mahler et al., 2003).

Past campaigns using education to increase the public's level of knowledge and decrease people's hazardous behaviour (i.e., tanning) have not been completely successful: high levels of knowledge are not translating into the adoption of appropriate sun protective behaviours (Cockburn et al., 1989; Keesling & Freedman, 1987; Miller et

al., 1990). Incorporating photoaging information and images into interventions have been found to be an effective strategy at increasing people's sun protection behaviours and decreasing risky behaviours (Gibbons et al., 2005, Mahler et al., 2003, 2007) through explicitly illustrating the damage caused by UV exposure thus, making the negative appearance consequences of UV exposure more salient, immediate, and certain.

Findings from a large number of experimental studies suggest that attitude change is arbitrated by the amount of fear aroused (Leventhal, 1970; Sutton, 1982). However, does attitude change cause behaviour change? This link is one of ambiguity and depends on a range of factors including direct experience with the attitude object and frequency of reporting (Glasman & Albarracin, 2006). In regards to behaviour change resulting from attitude change through the use of photoaging interventions; previously conducted research shows that photoaging interventions positively impact on sun protective attitudes and has been found to consequently translate into appropriate sun protective behaviour adoption (Gibbons et al., 2005; Mahler et al., 2003, 2007).

An extensive literature review has revealed that to date, *no* studies employing photoaging images and information with Australian female adolescents have been conducted in the field. There is a need, therefore, for further investigation into the effectiveness of the photoaging intervention to explore whether photoaging images and information have an effect on female adolescents' attitudes. Adolescents and young adults are important target groups for effective skin protection messages as this age group offers the greatest potential for the reduction of the incidence of skin cancer (Livingstone et al., 2001).

The Health Belief model posits that the likelihood that someone will take preventative action depends on the threat of the health problem (Caltabiano & Sarafino,

2002). It would therefore make sense then, that by using photoaging images to highlight the deleterious effects of tanning on one's appearance, it would personalize the threat, increasing feelings of fear and susceptibility and consequently enhancing a person's intention and urge to take preventative actions.

Overview of the Present Study

Of primary interest in this study, was whether or not the photoaging intervention would increase the sun protection attitudes of female adolescents. Participants were randomly allocated into one of two conditions: education or photoaging, to test the effect of the photoaging images and information on their attitudes toward sun protection compared to the effect on attitude change of those not exposed to any photoaging information. In order to establish the methodology of this research it is necessary to clarify the term 'attitude.' Attitude is defined as a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations to which it is related (Allport, 1935 cited in Gross, 2001). Attitude is an important concept that is useful to understand as it predicts the reactions that people may have toward an object or change and is a strong influence on behaviour (Fishbein & Ajzen, 1975).

Attitude change in this study was measured along four attitudinal constructs: fear about sun exposure, as attitude change is mediated, in part, by the amount of fear aroused (Leventhal, 1970); intention to increase sun protection, emphasized by the Theory of Planned Behaviour as a proximal determinant of behaviour (Ajzen & Madden, 1986); urge to reduce sun exposure, as experienced by social norms and expectations from peers, which is one of the cognitions proposed in the Theory of Reasoned Action and has been

confirmed in many studies to alter attitudes and behaviour (Sheppard, Hartwick, & Warshaw, 1998); and finally, sensibility to reduce sun exposure of which levels are mediated by fear and as the Health Belief model posits, high levels of sensibility (i.e., susceptibility) lead to significant changes in attitude (Witte & Allen, 2000). Although this study did not aim to explicitly test the Health Belief Model on any of its primary themes, the model, along with the Theory of Reasoned Action and the Theory of Planned Behaviour, provides the framework and rationale for the choice of the four attitude measures chosen.

The current intervention expected to raise participants' perceived susceptibility to photoaging through decreasing appearance-based rewards of tanning by highlighting the detrimental effects of tanning on one's personal appearance through the use of explicit photoaging images. Inducing fear about the negative consequences of one's actions (or lack of actions) is said to motivate a person to comply with the recommended behaviours in order to avoid the negative consequences, that is, photoaging (Devos-Comby & Salovey, 2002). Thus, the current research addressed the question: does viewing photoaging images and information affect the attitudes of adolescent females toward sun protection with the main hypothesis proposing that viewing the photoaging presentation will cause a significantly greater change in participant's attitudes toward sun protection compared to those participants viewing the educational presentation alone. The educational group of participants were not exposed to any photoaging images or information. Both groups viewed the same presentation about skin cancer, the education group, however, did not view the additional vivid photoaging images and information and thus acted as the 'control' against which the photoaging group was compared in order to assess the effectiveness of the photoaging intervention on attitude change.

Method

Participants

Sixty-six female year 10 students from three Western Australian schools participated. The majority of participants were Caucasian (74%), an important factor as Caucasians are at the highest risk for later development of skin cancer (Arthey & Clarke, 1995), and their ages ranged from 15 to 17 and a half years ($M = 15.5$, $SD = 0.41$).

Intervention Materials

An information sheet outlining the research (Appendix A) and consent form (Appendix B) were distributed to parents of all year 10 students in the three participating schools. Information was presented via a slide show presentation which consisted of 27 slides of information regarding skin cancer, UV radiation, and ways to protect from the sun (e.g., when to avoid sun exposure and information on how to use sunscreen to gain its maximum benefits). The length of the educational slide show presentation was seven minutes. Participants in the photoaging group were exposed to 12 additional slides on photoaging which graphically depicted, through UV-filtered photographs, photoaging in the form of wrinkles and age spots (refer to Figure 1). These photographs explicitly illustrate the effects of long-term sun exposure. The photoaging presentation also included a three minute film clip on photoaging taken from the 20/20 program in its Healthwatch segment (American Broadcasting Corporation, 2001). The length of the

photoaging presentation was 12 minutes. Refer to Appendix C for intervention presentations.

Figure 1. A photograph taken under normal light and a photograph taken under UV-light, contrasting the negative effects of sun exposure on appearance (i.e., photoaging).

Procedure

Ethical clearance was obtained from the Edith Cowan University ethics committee prior to commencing the study. On participants' arrival to the testing sessions which were conducted in classrooms, they were randomly allocated into either the education group or the photoaging group. The study was then introduced as an exploration into attitudes towards sun protection and sun exposure and an outline of the nature of participants' involvement and the intended use of the information gained was

given by the researcher. Participants were also notified that they may withdraw their participation at any time. All of the participants then completed the pre-intervention section of the questionnaire booklet that assessed baseline UV exposure and protection attitudes and knowledge. Participants were asked to answer all the questions honestly and not to speak with anyone else while completing the questionnaire. Depending on condition, participants then watched the presentations, either with, or without exposure to the photoaging images and information. All of the participants then completed the post-intervention section of the questionnaire booklet. At the conclusion of the sessions, participants were thanked and partially debriefed on the true nature of the study.

Measures

The effectiveness of the photoaging intervention was examined using an anonymous self-report questionnaire (Appendix D) which was divided into two sections: pre-intervention and post-intervention. The questionnaires included sections on participants' skin type, behaviour when outdoors, knowledge on skin cancer, and thoughts on sun safety. These variables were not the primary focus of this study. They did, however, provide additional information to the researcher for possible further conclusions or hypotheses if analyses deemed necessary. This study specifically focused on participants' attitudes before and after viewing (or not viewing) the photoaging information and images as assessed by their levels of fear, intention, urge, and sensibility. These were in the 'Feelings' section of the questionnaire and were of primary interest in this study.

The 'Feelings' subsection of the survey consisted of four items: fear, intention, urge, and sensibility, and used five-point Likert scales (1-5) to gauge how strongly participants' intended to increase their level of sun protection, how fearful they felt about being exposed to the sun, how strongly they felt that reducing their sun exposure was a sensible thing to do and how strongly they felt the urge to reduce the time they spent in the sun. These four variables (fear, intention, urge, and sensibility) assessed the effects of inclusion or non-inclusion of the photoaging information and images in the intervention. The following section explicates how these variables were presented in the questionnaires.

Fear. Participants were instructed to mark their response to the question "At this time, how fearful do you feel about being over exposed to the sun?" (pre-intervention) and "After viewing the presentation, how fearful do you feel about being over exposed to the sun?" (post-intervention) along a 5-point Likert scale which ranged from "No fear at all" (1 on the Likert scale) to "Extremely fearful" (5 on the Likert scale).

Intention. To assess intentions to increase levels of sun protection, participants were asked "At this time, how strongly do you intend to increase your level of protection from the sun" (pre-intervention) and "After viewing the presentation, how strongly do you intend to increase your current level of protection from the sun?" (post-intervention). Again, responses were marked along a 5-point scale ranging from "Not at all" (1) to "Very strongly" (5).

Urge. Participants' levels of urge to reduce sun exposure was measured in a similar way with pre-and post-intervention questions asking "At this time" or "After viewing the presentation" respectively, "How strongly do you feel an urge to reduce your

time in the sun?" Answers were marked on a 5-point Likert scale ranging from "No urge at all" (1) to "A very strong urge" (5).

Sensibility. An increase in a person's perceived susceptibility to the consequences of excessive sun exposure causes an increase in feelings of sensibility. This was assessed with the question "At this time, how strongly do you feel that reducing your exposure to the sun is a sensible thing to do?" and "After viewing the presentation, how strongly do you feel that reducing your time in the sun is a sensible thing to do?" Answers ranged from "Not at all" (1) to "Very strongly" (5).

Questionnaires were divided into pre-intervention and post-intervention sections to enable comparison between participants' mean difference attitude scores before and after the respective presentations.

Results

Data Screening

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 14. Prior to analysis, the measures of participants' attitudes of fear, intention, urge, and sensibility were examined for accuracy of data entry, missing values, and the assumptions of univariate analysis. Assumptions were deemed satisfactory and no missing values or outliers were found.

Procedure for Analysing the Dependent Variables

To determine the initial equivalence of the groups, t-tests were performed on the pre-intervention Likert scale scores for each of the four dependent variables: fear,

intention, urge, and sensibility. This examined whether or not the groups were significantly different from each other before the intervention was run so that after the intervention, any differences found between the groups could be attributed to the effect of the intervention. Consistent with the t-test analysis conducted on the pre-intervention scores, separate t-tests were then conducted for each of the four dependent variables on participants' post-intervention scores. These measured group-mean differences after the intervention. Table 1 sets out the mean Likert scale scores at pre-intervention and post-intervention for each of the four dependent variables.

Table 1

Mean Likert scale Scores at Pre-Intervention and Post-Intervention

Dependent Variable	Education Group		Photoaging Group	
	Pre-test	Post-test	Pre-test	Post-test
Fear				
M	2.40	2.50	2.39	3.46
SD	1.05	0.99	0.97	1.02
Intention				
M	2.83	2.92	2.87	3.59
SD	0.91	1.17	1.13	1.05
Urge				
M	2.08	2.59	2.37	3.38
SD	0.96	1.11	1.06	1.19
Sensibility				
M	2.94	3.39	3.15	3.91
SD	0.99	1.02	1.11	0.98

Due recognition has been given to the fact that it is not necessarily correct to merely compare the groups' post-intervention scores on the attitude variables to determine the effectiveness of the intervention as these do not take into account

individuals' pre-intervention scores. A more valid approach would be to analyse the groups' mean difference scores which does take the pre-intervention scores into account. Hence, the difference score for each group (education and photoaging) on each of the four dependent variables is calculated by subtracting each person's pre-intervention score (as measured by the Likert-scale) from their post-intervention score for each dependent variable. These difference scores were then added and divided by N, providing the group mean difference scores for each of the dependent variables. T-tests were then used to compare the mean difference scores between groups to assess the effectiveness of the photoaging intervention. To add to the interpretation of the significance of primary findings of interest, effect sizes (using Cohen's *d*) were calculated.

Pre-Intervention Score Analysis

To determine the initial equivalence of the groups (i.e., to examine if there were significant differences between the groups prior to the intervention) t-tests were performed on participants' pre-intervention scores for each dependent variable. No significant difference was found between participants in the education versus photoaging groups on the amount of fear they felt about being over exposed to the sun, $t(64) = .04$, $p > .05$. No significant difference was found between participants in the education versus photoaging groups on their intentions to increase their sun protection, $t(64) = -.16$, $p > .05$. There was also no significant group differences for participants' urge to reduce their sun exposure before the intervention, $t(64) = -1.14$, $p > .05$, and no significant differences existed between the education versus photoaging groups on the measure of sensibility before the intervention, $t(64) = -.83$, $p > .05$. These findings indicate that, at

baseline, before the intervention, the education and photoaging groups did not differ significantly in their feelings of fear, intention, urge, and sensibility.

Post-Intervention Score Analysis

A secondary analysis was conducted, which involved comparing the education versus photoaging group participants' scores on their fear, intention, urge, and sensibility after the intervention was conducted. These analyses were conducted to maintain consistency with the previous analyses on pre-intervention scores, even though the primary analysis for this study assessed the effectiveness of the photoaging intervention using difference scores. The results showed that participants in the photoaging group, compared to the education group, had significantly higher self-reported levels of fear toward sun exposure, $t(64) = -3.90$, $p < .05$, intentions to increase levels of sun protection, $t(64) = -2.44$, $p < .05$, urge to reduce sun exposure, $t(64) = -2.78$, $p < .05$, and sensibility, $t(64) = -2.11$, $p < .05$. This particular analysis on participants' post-intervention scores alone, however, does not take into account each participant's baseline score and is therefore not necessarily valid.

Analysis of Difference Scores

Finally, group mean difference scores for each of the four dependent variables were analysed using t-tests, taking into account participants' baseline scores (pre-intervention scores) subtracted from the post-intervention scores, in order to assess the effect of the intervention on sun-protective attitudes. Prior to hypothesis testing, measured variables were assessed for the assumptions of univariate analysis. Kolmogorov-Smirnov statistics indicated that for all the four dependent variables, the

assumption of normality was met ($p > .05$). All assumptions were deemed satisfactory. Table 2 sets out the groups' mean difference scores for each dependent variable.

Table 2

Mean Difference Scores

Dependent Variable	Education Group	Photoaging Group
Fear		
M	0.10	1.07
SD	0.77	0.74
Intention		
M	0.09	0.72
SD	1.05	0.86
Urge		
M	0.51	1.01
SD	0.80	0.89
Sensibility		
M	0.45	0.76
SD	1.01	0.77

Fear. Results revealed that there was a between-groups difference on the measure of fear after the intervention was conducted, with participants in the photoaging group experiencing a greater amount of fear ($M = 1.07$, $SD = 0.74$), than those in the education group ($M = 0.10$, $SD = 0.77$). This difference was found to be significant, $t(64) = -5.20$, $p < .05$, $d = 1.28$, representing a markedly large effect size and indicating that mean group difference scores between participants' pre and post-intervention feelings of fear were significantly higher for participants in the photoaging intervention than for those in the education intervention.

Intention. A significant difference was found between the education and photoaging groups on their intentions to increase sun protection, $t(64) = -2.66$, $p < .05$,

with participants in the photoaging intervention reporting significantly higher levels of intention to increase their sun protection after the intervention, than those who viewed the educational presentation. In other words, exposure to the photoaging images and information caused a significant increase in participants' intentions ($M = 0.72$, $SD = 0.86$) compared to the intentions of those who watched the educational presentation ($M = 0.09$, $SD = 1.05$). Cohen's d ($d = 0.66$) demonstrates a medium effect size.

Urge. Results revealed that after the intervention a difference existed between the photoaging and education group in their self-reported levels of urge, with participants in the photoaging group indicating a larger increase in their feelings of urge to reduce the time they spend in the sun, compared to participants in the education group. This between-groups difference was found to be significant, $t(64) = -2.40$, $p < .05$, $d = 0.59$, representing a medium size effect. That is, the mean difference scores between pre and post-intervention feelings of urge were significantly larger for the photoaging group ($M = 1.01$, $SD = 0.89$) than the education group ($M = 0.51$, $SD = 0.80$).

Sensibility. No statistically significant difference was found regarding participants' feelings of sensibility between the photoaging group and the education group after the intervention, $t(64) = -1.38$, $p > .05$. Despite the non-significant difference found between groups on the measure of sensibility, the difference did represent a small to medium sized effect, $d = 0.35$. The results, while not significant, trended in the predicted direction. That is, participants in the education group showed a smaller difference in their feelings of sensibility between their pre and post-intervention scores ($M = 0.45$, $SD = 1.01$) than participants in the photoaging group ($M = 0.76$, $SD = 0.77$). In other words, despite being non-significant, these results revealed that exposure to the photoaging images and information had an impact on participants' feelings of sensibility,

with an increase in feelings of sensibility after the intervention. Statistical analyses are presented in Appendix E.

Discussion

Few prior studies have focused on the effect of using photoaging as an intervention strategy for promoting sun-safety. This exploratory study assessed the effectiveness of an appearance-based intervention using photoaging information and images to promote sun safety, on the attitudes (fear, intention, urge, and sensibility) of adolescent females aged between 15 and 17 years, compared to an education-based intervention. Results revealed that the photoaging intervention had a significant impact on participants' attitudes toward sun protection. What was found was that exposure to the photoaging intervention produced immediate increases in participants' self-reported levels of sensibility (susceptibility), fear of sun exposure, intentions to sun-protect, and urge to reduce sun exposure, although not all were significantly increased. The following sections will expand on this.

Results of the current study reveal that exposure to photoaging images and information affected participants' attitudes toward sun protection. It was expected that through exposure to photoaging images and information, the proximal consequence of sun exposure (i.e., photoaging) would be made more personalised and would result in reactions of fear. Findings confirmed this and interestingly, the largest effect that the photoaging intervention had on participants' attitudes toward sun protection was on their levels of fear. Although participants in both the education and photoaging groups had similarly low levels of fear before the intervention was conducted, participants in the photoaging group experienced a significantly larger increase in the levels of fear that they

experienced after the intervention compared to participants in the education group. By highlighting, through photoaging images, the negative appearance consequences of sun exposure, the risk to participants' appearance was made more salient causing an escalation in levels of fear. This finding strongly supports the proposition that it is the shock tactic or vividness of the personalised photoaged picture that results in fear being a prominent reaction of participants (Fulton, 1997). Past research shows that this experience of fear motivates behaviour change (Gibbons et al., 2005; Mahler et al., 2003, 2007).

As fear mediates feelings of sensibility experienced by a person (Witte & Allen, 2000), it would be expected that high levels of fear translate into increased feelings of sensibility. Interestingly, despite a remarkable increase in fear resulting from the photoaging intervention, there was no significant difference between the two groups after the intervention in their feelings of sensibility. Of note, however, is that the pre-test scores on this dependent variable were fairly high for both the education group (M = 2.94) and the photoaging group (M = 3.15) and this may have contributed to the non-significant result. Additionally, it may have been the case that the wording of the question may not have been constructed sensitively enough for this particular age group. Despite a non-significant result for the sensibility variable, trends were found in the predicted direction: the photoaging group reported increased feelings of sensibility. That is, exposure to the photoaging images and information caused an increase in participants' self-reported feelings of sensibility. This increase between participants' pre and post-intervention sensibility also resulted from the education intervention, but the increase for participants in the photoaging group was larger. So although both interventions increased participants' feelings of sensibility, the effect of the photoaging material was not great

enough to yield a significance difference between the two groups.

As anticipated, the photoaging intervention was successful at raising self-reported intentions to increase participants' levels of sun protection. Again, mean group scores revealed that both the education intervention and the photoaging intervention increased participants' intentions to increase their sun protection, but inclusion of the photoaging material caused a significantly larger increase of intentions for those participants exposed to it than for those in the education intervention group who did not view any photoaging material. As previously noted, the Theory of Planned Behaviour emphasizes intention as a proximal determinant of behaviour, therefore, it would be expected that the high levels of intention experienced by participants in the photoaging group would translate then, into appropriate sun-protective behaviours.

A significantly larger increase between participants' pre and post-intervention feelings of urge (to reduce sun exposure) resulted from the photoaging intervention compared to the education intervention. Both interventions raised participants' feelings of urge to reduce their sun exposure, but the addition of the photoaging material in the intervention caused a significantly larger increase for participants. This implies that exposure to photoaging images and information is an effective way to increase a person's urge which has previously been confirmed to be a precursor for behaviour change (Sheppard, Hartwick, & Warshaw, 1998). It therefore stands to reason that increases in participants' urges, through exposure to photoaging images, should motivate the adoption of sun-protective behaviours.

Findings from the current study are consistent with the hypothesis that viewing the photoaging presentation would be significantly more effective in changing participants' attitudes toward sun protection than viewing the educational presentation,

except, as noted previously, with regards to the sensibility variable. The photoaging intervention positively affected attitudes of the adolescent females involved in this study, increasing self-reported feelings of fear, intention, urge, and sensibility, although, sensibility was not significantly affected by the intervention. Interestingly, findings also revealed that, although not significantly, attitudes of the participants in the education presentation were also altered, with a slight increase in feelings of all four measures. Therefore, although educational health promotion interventions such as this, may be reasonably effective at affecting attitudes toward sun protection, the employment of photoaging images to personalize the consequence of sun exposure on appearance, evidently has a superior affect on attitudes of female adolescents toward sun-protection. The current findings are consistent with prior research targeting the threat of photoaging (Gibbons et al., 2005; Mahler et al., 2003, 2007), further substantiating past research which posits that the use of photoaging as an appearance-based intervention is a more effective way to present health-promotion messages (with regard to skin cancer) than informative, education-based interventions.

A few factors limited the current study, one of which is the limited sample. Using minors in research can be challenging as parental consent is necessary, and as such, the sample used in this study was smaller than expected. Self-report techniques, although an effective way of measuring attitudes, can sometimes be less objective than other types of data collection due to its proneness to social factors such as social desirability. These limitations must not, however, over-shadow the contribution that this study has made to this area of psychological enquiry. The current study provides original evidence that the use of photoaging as an intervention is a successful strategy for positively changing attitudes towards sun protection in an Australian female adolescent population.

Interventions such as this have important implications for future health promotion efforts. These appearance-based photoaging interventions are brief, inexpensive to administer and require little staff time, and may therefore hold promise for promoting positive attitudes toward sun protection and thus decreasing skin cancer incidence in the population. It is imperative that further research be conducted on the longer term effectiveness of the photoaging message to examine actual behaviour change following the initial presentations.

References

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology, 22,* 453–474.

Arthey, S., & Clarke, V. A. (1995). Suntanning and sun protection: A review of the psychological literature. *Social Science and Medicine, 40,* 265–274.

Australian Institute of Health and Welfare (2000). *Cancer in Australia, 1997.* Canberra: Australian Institute of Health and Welfare, AIHW.

Berneburg, M., Plettenberg, H., & Krutmann, J. (2000). Photoaging of human skin. *Photodermatology, Photoimmunology & Photomedicine, 16*(6), 239–244.

Borland, R., Hill, D., & Noy, S. (1990). Being sunsmart: Changes in community awareness and reported beahvior following a primary prevention program for skin cancer control. *Behavioral Change, 7,* 126–135.

Broadstock, M., Borland, R., & Gason, R. (1992). Effects of suntan on judgements of healthiness and attractiveness by adolescents. *Journal of Applied Social Psychology, 22,* 157–172.

Buller, D. B., & Borland, R. (1999). Skin cancer prevention for children: A critical review. *Health Education and Behavior, 26*(3), 317–343.

Caltabiano, M. L., & Sarafino, E. P. (2002). *Health psychology: Biopsychosocial interactions.* Singapore, Malaysia: Seng Lee Press.

Castle, C. M., Skinner, T. C., & Hampson, S. E. (1999). Young women and suntanning: An evaluation of a heath [sic] education leaflet. *Psychology and Health, 14,* 517–527.

Cockburn, J., Hennrikus, D., Scott, R., & Sanson-Fisher, R. (1989). Adolescent use of sun protection measures. *Medical Journal of Australia, 151,* 136–149.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Devos-Comby, L., & Salovey, P. (2002). Applying persuasion strategies to alter HIV-relevant thoughts and behavior. *Review of General Psychology, 6,* 287–304.

Eiser, J. R., Eiser, C, & Pauwels, P. (1993). Skin cancer: Assessing perceived risk and behavioural attitudes. *Psychology and Health, 8,* 393–404.

Eiser, J. R., Eiser, C., Sani, F., Sell, L., & Casas, R. M. (1995). Skin cancer attitudes: A cross-national comparison. *British Journal of Social Psychology, 34,* 23–30.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research.* London: Addison-Wesley.

Foot, G., Girgis, A., Boyle, C. A., & Sanson-Fisher, R. W. (1993). Solar protection behaviors: A study of beachgoers. *Australian Journal of Public Health, 17,* 209–214.

Fulton, J. E. (1997). Utilizing the ultraviolet (UV) detect camera to enhance the appearance of photo damage and other skin conditions. *Dermatologic Surgery, 23,* 163–169.

Gibbons, F. X., & Gerrard, M. (1997). Health Images and Their Effects on Health Behaviour. In: B. P. Buunk, & F. X. Gibbons (Eds.), *Health, Coping, and Well-Being.* (pp. 63–94). Mahwah, New Jersey: Lawrence Erlbaun Associates.

Gibbons, F. X., Gerrard, M., Lane, D. J., Mahler, H. M., & Kulik, J. A. (2005). Using UV photography to reduce use of tanning booths: A test of cognitive mediation. *Health Psychology, 24,* 358–363.

Gilchrest, B. A., & Rogers, G. (1993). Photoaging. In: H. Lim, & N. Soter (Eds.), *Clinical Photomedicine.* (pp. 95–111). New York: Marcel Dekker.

Glasman, L. R., & Albarracin, D. (2006). Forming attitudes that predict future behavior: A meta-Analysis of attitude-behaviour Relation. *Psychological Bulletin, 132,* 778–822.

Goosens, L. (1984). Imaginary audience behavior as a function of age, sex, and formal operational thinking. *International Journal of Behavioral Development, 7,* 77–93.

Gross, R. (2001). *Psychology: The Science of Mind and Behaviour.* London; Hodder and Stoughton.

Guercio-Hauer, C., MacFarlane, D. F., & Deleo, V. A. (1994). Photodamage, photoaging and photoprotection of the skin. *American Family Physician, 50,* 337–332.

Hill, D., & Rassaby, J. (1984). Determinants of intentions to take precautions against skin cancer. *Community Health Studies, 7,* 33–44.

Hill, D., & Dixon, H. (1999). Promoting sun protection in children: Rationale and challenges. *Health Education and Behavior, 26*(3), 409–417.

Hill, D., & Boulter, J. (2002). *Sun protection behaviour: Determinants and trends.* Retrieved June 26, 2007:http://home.vicnet.net.au/~menzies/hilltxt.htm

Jackson, K. M., & Aiken, L. S. (2000). A psychosocial model of sun protection and sunbathing in young women: The impact of health beliefs, attitudes, norms, and self-efficacy for sun protection. *Health Psychology, 19*(5), 469–478.

Jackson, K. M., & Aiken, L. S. (2006). Evaluation of a Multicomponent Appearance-Based Sun-Protective Intervention for Young Women: Uncovering the Mechanisms of Program Efficacy, *Health Psychology, 25*(1), 34–46.

Keesling, B., & Friedman, H.S. (1987). Psychosocial factors in sunbathing and sunscreen use. *Health Psychology, 6,* 477–493.

Leary, M. R. & Jones, J. L. (1994). Effects of appearance-based admonitions against sun exposure on tanning intentions in young adults. *Health Psychology, 13,* 86–90.

Leary, M. R., Tchividijian, L. R., & Kraxberger, B. E. (1994). Self-presentation can be hazardous to your health: Impression management and health risk. *Health Psychology, 13,* 461–470.

Leventhal, H. (1970). Findings and theory in the study of fear communications. *Advances in Experimental Social Psychology, 5,* 119–136.

Livingston, P. M., White, V. M., Ugoni, A. M., & Borland, R. (2001). Knowledge, attitudes and self-care practices related to sun protection among secondary students in Australia. *Health Education Research, 16*(3), 269–278.

Lowe, J. B., Balanda, K. P., Gillespie, A. M., Del Mar, C. B., & Gentle, A. F. (1993). Sun-related attitudes and beliefs among Queensland school children. *Australian Journal of Public Health, 17,* 202–208.

Mahler, H. M., Kulik, J. A., Gibbons, F. X., Gerrard, M., & Harrell, J. (2003). Effects of appearance-based interventions on sun protection intentions and self-reported behaviors. *Health Psychology, 22,* 199–209.

Mahler, H. M., Kulik, J. A., Gerrard, M., & Gibbons, F. X. (2007). Long-Term Effects of Appearance-Based Interventions on Sun Protection Behaviors. *Health Psychology, 26*(3), 350–360.

Marks, R. (1999). Two decades of the public health approach to skin cancer control in Australia: Why, how and where are we now? *Australasian Journal of Dermatology, 40,* 1–5.

Mathers, C., Penn, R., Sanson-Fisher, R., Carter, R., & Campbell, L. (1998). *Health System Costs of Cancer in Australia 1993–4.* Australian Institute of Health and Welfare and National Cancer Control Initiative, Canberra.

Mermelstein, R. J., & Riesenberg, L. A. (1992). Changing knowledge and attitudes about skin cancer risk factors in adolescents. *Health Psychology, 11*(6), 371–376.

Miller, A. G., Ashton, W. A., McHoskey, J. W., & Gimbel, J. (1990). What price attractiveness? Stereotype and risk factors in suntanning behavior. *Journal of Applied Social Psychology, 20,* 1272–1300.

National Health and Medical Research Council (1996). *Primary prevention of skin cancer in Australia: Report of the sun protection programs working party.* NHMRC, Canberra.

Parker, S. L., Tong, T., Bolden, S., & Wingo, P. A. (1997). Cancer statistics. *Ca: A Cancer Journal for Clinicians, 46,* 5–27.

Pratt, K., & Borland, R. (1994). Predictors of sun protection among adolescents at the beach. *Australian Psychologist, 29,* 135–139.

Robinson, J. K., Rigel, D. S., & Amonette, R. A. (1997). Trends in sun exposure knowledge, attitudes, and behaviors: 1986 to 1996. *Journal of the American Academy of Dermatology, 37,* 179–186.

Rodrigue, J.R. (1996). Promoting healthier behaviors, attitudes, and beliefs toward sun exposure in parents of young children. *Journal of Consulting and Clinical Psychology, 64,* 1431–1436.

Scharffetter-Kochanek, K. (1997). Photoaging of the connective tissue of skin: its prevention and therapy. *Advances in Pharmacology, 38,* 639–655.

Self, C. A., & Rogers, R. W. (1990). Coping with threats to health: Effects of persuasive appeals on depressed, normal, and antisocial personalities. *Journal of Behavioral Medicine, 13,* 343–257.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1998). The theory of reasoned action: A meta-analysis with recommendations for modifications and future research. *Journal of Consumer Research, 15,* 325–343.

Sutton, S. R. (1982). Fear arousing communications: A critical examination of theory and research . In J. R. Eiser (Ed.), *Social psychology and behavioral medicine.* New York: John Wiley & Sons.

Taylor, C. R., Stern, R. S., & Leyden, J. J. (1990). Photoaging, photodamage and photoprotection. *Journal of American Academic Dermatology, 22,* 1–15.

Turrisi, R., Hillhouse, J., & Gebert, C. (1998). Examination of cognitive variables relevant to sunbathing. *Journal of Behavioral Medicine, 21,* 299–313.

Vail-Smith, K., & Felts, W. M. (1993). Sunbathing: College students' knowledge, attitudes, and perceptions of risk. *College Health, 42,* 21–26.

Wichstrom, L. (1994). Predictors of Norwegian adolescents' sunbathing and use of sunscreen. *Health Psychology, 13,* 412–420.

Witte, K. (1994). Generating effective risk messages: How scary should your risk communication be? *Communication Yearbook, 18,* 229–254.

Witte, K., & Allen, M. (2000). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education & Behaviour, 27*(5), 591–615.

Appendix A

Information Form

Dear Sir or Madam,

My name is Suzanna Papasavvas and I am writing to request permission for your daughter's participation in a short study. I am conducting this study as part of my research requirement for my Honours degree in Psychology at Edith Cowan University. It has been approved by the university's Research Ethics committee.

I am studying the knowledge and attitudes of high-school girls towards sun exposure and sun damage. If you agree to allow your daughter to participate, she will watch an educational presentation on sun exposure, skin cancer, ultraviolet rays and ways to minimise the effects of the sun and protect the skin from sun damage. Questionnaires will be handed out before and after the presentations and students will be asked to voluntarily and anonymously fill these out. The questionnaire seeks to ask your daughter's opinions and feelings about sun protection. The data gathered in this study may be published however, no information indicating your daughter's identity will be included.

I hope this study will help us understand more about people's attitudes towards sun exposure and believe that your daughter's participation will be beneficial as it will inform and caution her about the dangers of overexposure to the sun. Participation in this research is not connected with the school's assessment.

A consent form is included. Your signature on the consent form indicates you have read this information and give your consent for your daughter to participate in this study. Students are free to withdraw from the study at any stage. Please keep this letter for your information. If you have any questions, please do not hesitate to contact me on [redacted] or my supervisor Dr Paul Chang on 6304 5745. If you have any concerns about the project or would like to talk to an independent person, you may call Dr. Dianne McKillop on 6304 5736.

Thank you for reading this form. I greatly appreciate your help to make this study possible.

Yours Sincerely,

Suzanna Papasavvas
School of Psychology
Edith Cowan University

Appendix B

Consent Form

I.....have read the information sheet provided with this consent form and any questions I have asked have been answered to my satisfaction.

I agree for my daughter to participate in the activities associated with this research and I understand that she can withdraw at any time.

I understand that my daughter's questionnaire responses will be anonymously recorded and treated confidentially.

I agree that the data (averaged across all participants) gathered in this study may be published. No information indicating my daughter's identity will be included.

Name: .....

Signed: .....

Date: .....

Appendix C

Education and Photoaging Presentations

Appendix D

The Sun Study

Questionnaire

Picture designed by Tommy Cordin

Thank you for taking part in the Study.

Please answer all of the questions. Remember that your participation is voluntary. Your answers are STRICTLY CONFIDENTIAL and will only be seen by members of the researcher.

Questions about your skin

Below are some questions about your skin. Please note there are no right or wrong answers.

1. **Imagine you spent 30 minutes in the sun in the middle of the day for the first time in summer. If you were not wearing sunscreen, do you think you would:** *(Circle one)*

a) Get severe sunburn with blistering
b) Have painful sunburn
c) Get mildly burnt
d) Not get sunburnt at all

2. **Imagine you spent short periods of time in the sun everyday over the summer (without sunscreen). How do you think your skin would look at the end of the summer?** *(Circle one)*

a) Very tanned
b) Moderately tanned
c) Lightly tanned
d) No suntan at all

3. **Compared to most others I know of the same age, I have:** *(Circle one)*

a) More moles than most
b) About the same number of moles as most
c) Fewer moles than most
d) I have no moles
e) I don't know

Questions about your behaviour when outdoors

Below are some questions relating to your behaviour. Remember, there are no right or wrong answers.

4. **During the recent summer holidays, how often did you wear a hat (including beach, excursion, outside at home)?** *(Circle one)*

a) None or hardly any of the time
b) Some of the time
c) About half the time
d) Most of the time
e) All, or almost all of the time
f) I didn't need to because I always wear a hat without being told

5. **During the recent summer holidays, how often did you apply sunscreen (including beach, excursion, outside at home)?** *(Circle one)*

a) Never
b) Rarely
c) Sometimes
d) Most of the time
e) Always

6. **When I put on sunscreen, I do so for the following reasons:** *(Circle all that apply)*

a) To prevent sunburn
b) To protect myself from skin cancer
c) To prevent later onset of wrinkles
d) To moisturise my skin

What are your thoughts about sun safety?

The following questions ask for your thoughts and opinions about sun safety.

7. **Please indicate to what extent you agree or disagree with EACH of the following statements, by circling the number that corresponds to your answer.** *(Remember, there are no right or wrong answers)*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Circle one number for each statement					
a) Suntanned skin is more attractive than skin that is not suntanned	1	2	3	4	5
b) I look better with a suntan	1	2	3	4	5
c) A suntan makes me look healthy	1	2	3	4	5
d) It's more important me to have a suntan now, than to worry about future wrinkles from sun damage	1	2	3	4	5

8. **During which hours should you stay out of the sun to prevent skin damage?** *(Circle one)*

a) Between 10 am and 12 noon
b) Between 12 noon and 2pm
c) Between 10am and 3pm

9. Sunscreen should be applied: *(Circle one)*
a) Just before going outside
b) 15 minutes before going outside
c) 1 hour before going outside

10. Which type of skin cancer is most dangerous? *(Circle one)*
a) Melanoma
b) Squamous cell carcinoma
c) Basal cell carcinoma

11. Which type of skin cancer is most common? *(Circle one)*
a) Melanoma
b) Basal cell carcinoma
c) Squamous cell carcinoma

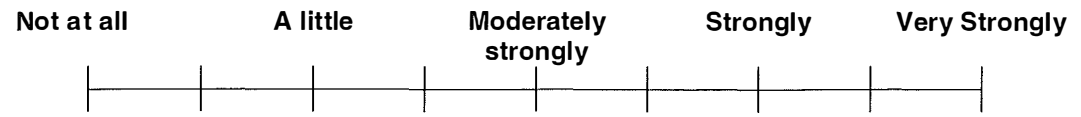
12. Please indicate to what extent you agree or disagree with EACH of the following statements, by circling the number which corresponds to your answer: *(Remember, there are no right or wrong answers)*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Circle one number for each statement					
a) Sunscreens are too inconvenient to use on a regular basis	1	2	3	4	5
b) Sunscreens are too expensive to use on a regular basis	1	2	3	4	5
c) I am worried about getting skin cancer	1	2	3	4	5
d) I am worried about the possibility of sun exposure causing my skin to age prematurely	1	2	3	4	5

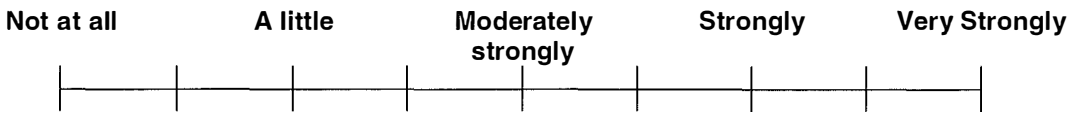
Your feelings

13. Please indicate your answer to EACH of the following statements, by placing a slash (/) anywhere along the line that best represents your response.

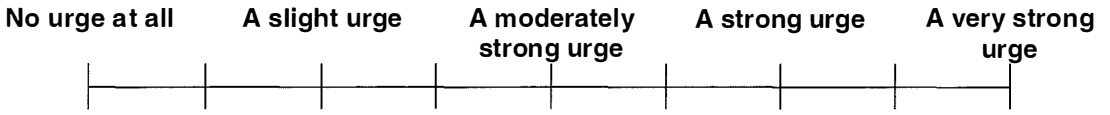
a) At this time, how strongly do you intend to increase your level of protection from the sun?



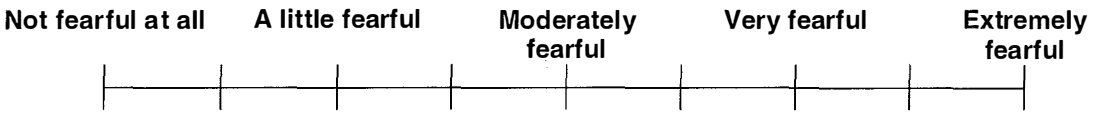
b) At this time, how strongly do you feel that reducing your exposure to the sun is a sensible thing to do?



c) At this time, how strongly do you feel an urge to reduce your time in the sun?



d) At this time, how fearful do you feel about being over exposed to the sun?



Questions about you

Please fill out the following questions that relate to you and your family

14. Your date of Birth _____ (day) _____ (month) _____ (year)

15. What is the main language spoken at home? _____

Now, please direct your attention to the presentation

Questionnaire

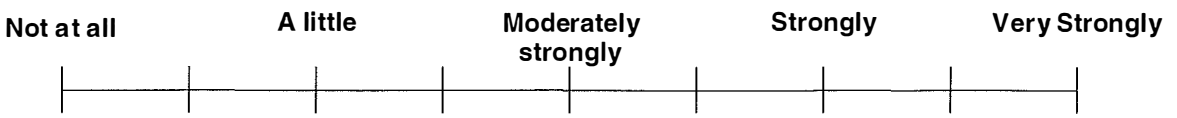
Continued.....

Please answer the following questions AFTER viewing the presentation.

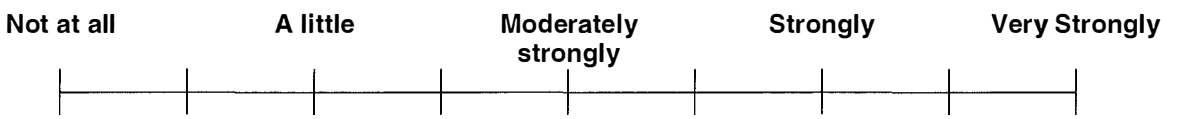
Your feelings

1. Please indicate your answer to EACH of the following statements, by placing a slash (/) anywhere along the line that best represents your response.

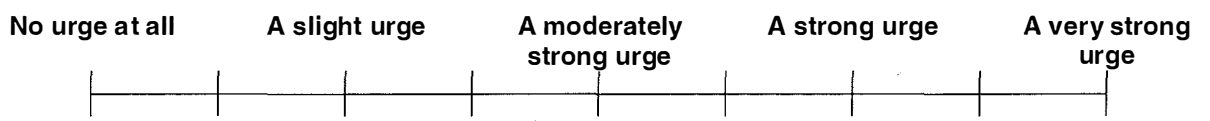
a) After viewing the presentation, how strongly do you intend to increase your current level of protection from the sun?



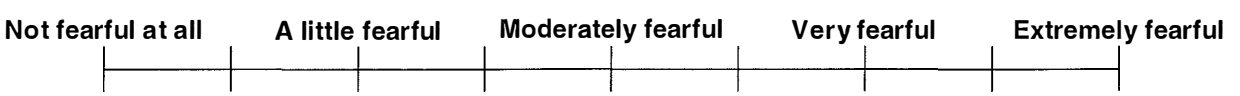
b) After viewing the presentation, how strongly do you feel that reducing your exposure to the sun is a sensible thing to do?



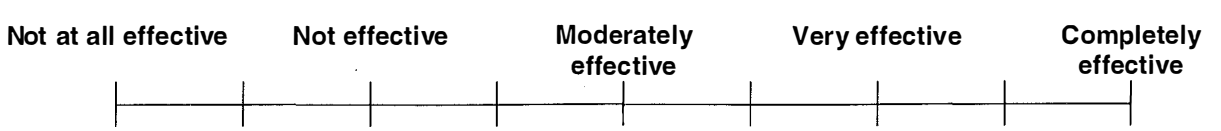
c) After viewing the presentation, how strongly do you feel an urge to reduce your time in the sun?



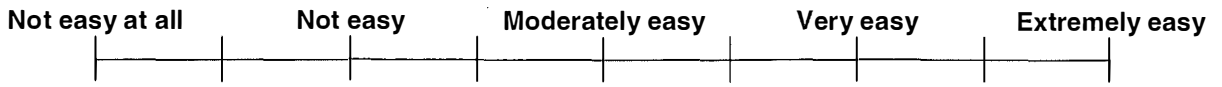
d) After viewing the presentation, how fearful do you feel about being over exposed to the sun?



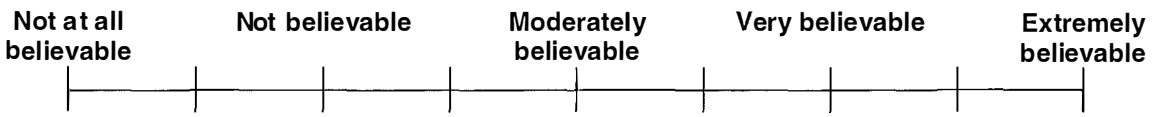
e) After viewing the presentation, how *effective* do you think protecting your skin will be in preventing skin cancer?



f) After viewing the presentation, how *easy* do you think it is to protect your skin from over exposure?



g) How *believable* was this presentation to you?



What are your thoughts about sun safety

The following questions ask for your thoughts and opinions about sun safety.

2. Please indicate to what extent you agree or disagree with EACH of the following statements, by circling the number that corresponds to your answer. Remember, there are no right or wrong answers.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Circle one number for each statement					
a) Suntanned skin is more attractive than skin that is not suntanned	1	2	3	4	5
b) I look better with a suntan	1	2	3	4	5
c) A suntan makes me look healthy	1	2	3	4	5
d) It's more important for me to have a suntan now, than to worry about future wrinkles from sun damage	1	2	3	4	5

3. During which hours should you stay out of the sun to prevent sun damage? *(Circle one)*
a) Between 10 am and 12 noon
b) Between 12 noon and 2pm
c) Between 10am and 3pm

4. Ultra Violet Radiation is _____ times higher in summer than in winter. *(Circle one)*
a) 3
b) 6
c) 10
d) The same in both summer and winter

5. Sunscreen should be applied: *(Circle one)*
a) Just before going outside
b) 15 minutes before going outside
c) 1 hour before going outside

6. Which type of skin cancer is most dangerous? *(Circle one)*
a) Melanoma
b) Squamous cell carcinoma
c) Basal cell carcinoma

7. Which type of skin cancer is the most common? *(Circle one)*
a) Melanoma
b) Basal cell carcinoma
c) Squamous cell carcinoma

8. Basal cell carcinomas (BCC) are most often found on: *(Circle one)*
a) The arms
b) The legs
c) The face

9. Approximately 60% of skin damage happens in the first: *(Circle one)*
a) 5 years of life
b) 15 years of life
c) 20 years of life
d) 25 years of life

10. Please indicate to what extent you agree or disagree with EACH of the following statements, by circling the number which corresponds to your answer:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Circle one number for each statement					
a) I am worried about getting skin cancer	1	2	3	4	5
b) I am worried about the possibility of sun exposure causing my skin to age prematurely	1	2	3	4	5

Your participation in this study is very important to me and I appreciate your responses, opinions and time. Thank you.

Appendix E

Statistical Analyses

T-Tests on Pre-Intervention Scores for each Dependent Variable

Intention

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
intention to increase sun protection-PRE	educational	33	2.8318	.90587	.15769
	photoaging	33	2.8712	1.13441	.19747

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
intention to increase sun protection-PRE	Equal variances assumed	1.509	.224	-.156	64	.877	-.03939	.25271	-.54424	.46545
	Equal variances not assumed			-.156	61.013	.877	-.03939	.25271	-.54472	.46593

Sensibility

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
reduce exposure sensible thing to do-PRE	educational	33	2.9394	.98898	.17216
	photoaging	33	3.1530	1.10559	.19246

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
reduce exposure sensible thing to do-PRE	Equal variances assumed	.206	.651	-.827	64	.411	-.21364	.25822	-.72950	.30222
	Equal variances not assumed			-.827	63.221	.411	-.21364	.25822	-.72962	.30235

Urge

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
urge to reduce time in sun-PRE	educational	33	2.0848	.95553	.16634
	photoaging	33	2.3682	1.06300	.18504

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
urge to reduce time in sun-PRE	Equal variances assumed	.801	.374	-1.139	64	.259	-.28333	.24882	-.78040	.21373
	Equal variances not assumed			-1.139	63.286	.259	-.28333	.24882	-.78051	.21384

Fear

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
how fearful of exposure-PRE	educational	33	2.3970	1.04724	.18230
	photoaging	33	2.3879	.96752	.16842

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
how fearful of exposure-PRE	Equal variances assumed	.267	.607	.037	64	.971	.00909	.24819	-.48673	.50492
	Equal variances not assumed			.037	63.603	.971	.00909	.24819	-.48679	.50497

T-Tests on Post-Intervention Scores for each Dependent Variable

Intention

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
intend to increase protection-POST	educational	33	2.9227	1.17008	.20368
	photoaging	33	3.5909	1.04981	.18275

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
intend to increase protection-POST	Equal variances assumed	1.139	.290	-2.442	64	.017	-.66818	.27365	-1.21486	-.12150
	Equal variances not assumed			-2.442	63.262	.017	-.66818	.27365	-1.21498	-.12138

Sensibility

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
reduce exposure sensible thing to do-POST	educational	33	3.3894	1.02009	.17758
	photoaging	33	3.9091	.98310	.17114

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
reduce exposure sensible thing to do-POST	Equal variances assumed	1.059	.307	-2.107	64	.039	-.51970	.24662	-1.01237	-.02702
	Equal variances not assumed			-2.107	63.913	.039	-.51970	.24662	-1.01238	-.02701

Urge

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
urge to reduce time in sun-POST	educational	33	2.5909	1.10535	.19242
	photoaging	33	3.3758	1.18771	.20675

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
urge to reduce time in sun-POST	Equal variances assumed	.211	.648	-2.779	64	.007	-.78485	.28244	-1.34908	-.22062
	Equal variances not assumed			-2.779	63.672	.007	-.78485	.28244	-1.34914	-.22056

Fear

Group Statistics

	IV	N	Mean	Std. Deviation	Std. Error Mean
how fearful of exposure-POST	educational	33	2.5000	.98979	.17230
	photoaging	33	3.4621	1.01674	.17699

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
how fearful of exposure-POST	Equal variances assumed	.006	.940	-3.895	64	.000	-.96212	.24701	-1.45558	-.46866
	Equal variances not assumed			-3.895	63.954	.000	-.96212	.24701	-1.45559	-.46866

T-Tests on Group Mean Difference Scores for each Dependent Variable

Sensibility

Group Statistics

	Cndtn	N	Mean	Std. Deviation	Std. Error Mean
diffsense	ed	33	.4500	1.01335	.17640
	photo	33	.7561	.77437	.13480

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
diffsense	Equal variances assumed	2.147	.148	-1.379	64	.173	-.30606	.22201	-.74958	.13746
	Equal variances not assumed			-1.379	59.870	.173	-.30606	.22201	-.75017	.13805

Intention

Group Statistics

	Cndtn	N	Mean	Std. Deviation	Std. Error Mean
diffintent	ed	33	.0909	1.04981	.18275
	photo	33	.7197	.86005	.14971

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
diffintent	Equal variances assumed	.682	.412	-2.662	64	.010	-.62879	.23624	-1.10074	-.15683
	Equal variances not assumed			-2.662	61.614	.010	-.62879	.23624	-1.10109	-.15648

Urge

Group Statistics

	Cndtn	N	Mean	Std. Deviation	Std. Error Mean
diffurge	ed	33	.5061	.80484	.14011
	photo	33	1.0076	.89102	.15511

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
diffurge	Equal variances assumed	.248	.620	-2.399	64	.019	-.50152	.20902	-.91907	-.08396
	Equal variances not assumed			-2.399	63.349	.019	-.50152	.20902	-.91916	-.08387

Fear

Group Statistics

	Cndtn	N	Mean	Std. Deviation	Std. Error Mean
difffear	ed	33	.1030	.77206	.13440
	photo	33	1.0742	.74458	.12961

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
difffear	Equal variances assumed	.002	.968	-5.202	64	.000	-.97121	.18672	-1.34422	-.59820
	Equal variances not assumed			-5.202	63.916	.000	-.97121	.18672	-1.34423	-.59819

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