
Portrayal of tanning, clothing fashion and shade use in Australian women's magazines, 1987–2005

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Abstract

To examine modelling of outcomes relevant to sun protection in Australian women's magazines, content analysis was performed on 538 spring and summer issues of popular women's magazines from 1987 to 2005. A total of 4949 full-colour images of Caucasian females were coded for depth of tan, extent of clothing cover, use of shade and setting. Logistic regression using robust standard errors to adjust for clustering on magazine was used to assess the relationship between these outcomes and year, setting and model's physical characteristics. Most models portrayed outdoors did not wear hats (89%) and were not in shade (87%). Between 1987 and 2005, the proportion of models depicted wearing hats decreased and the proportion of models portrayed with moderate to dark tans declined and then later increased. Younger women were more likely to be portrayed with a darker tan and more of their body exposed. Models with more susceptible phenotypes (paler hair and eye colour) were less likely to be depicted with a darker tan. Darker tans and poor sun-protective behaviour were most common among models depicted at beaches/pools. Implicit messages about sun protection in popular Australian women's magazines contradict public health messages concerning skin cancer prevention.

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Introduction

Skin cancer incidence and mortality in Australia are the highest in the world and costs to the health system associated with treatment are higher than for any other cancer [1, 2]. In the Australian state of Victoria, the skin cancer prevention programs Slip! Slop! Slap! (a public education campaign launched in 1980) and SunSmart (a broad-based program launched in 1988) have worked for >20 years to promote behaviour and environments that minimize people's risk of skin cancer [3]. Communications have sought to inform the public of the risks of excessive sun exposure and encourage positive sun protection practices such as wearing protective clothes, hats and sunscreen and staying in the shade at peak ultraviolet (UV) radiation times. Over the years, SunSmart has invested in paid mass media advertising (primarily television advertising campaigns) and carried out public relations activities aimed at generating unpaid media coverage (e.g. television news reports, newspaper articles, etc.) of skin cancer prevention messages. However, these efforts have occurred against a backdrop of mass media content independent of the SunSmart program that may also have reached consumers with messages with implications for skin cancer prevention.

Some earlier studies have examined skin cancer-relevant content in print media. Two studies suggest that from the 1980s up until the mid 1990s, fashion magazines in the United States and Australia may have shifted towards promoting lighter tans and greater clothing cover. Content analysis of 4000 photographs of models from midsummer editions of six Australian fashion magazines from 1982 to

1991 found trends of increase over time in the proportion of models wearing hats and depicted with light tans [4]. Content analysis of 3031 models from leading US fashion magazines between 1983 and 1993 revealed modest trends towards lighter tans, more women wearing hats and more sunscreen advertisements and sun awareness articles [5]. It is unknown whether these trends towards more pro-sun protection imagery in magazines have continued.

While on the surface the increase in sunscreen advertisements observed over time in the US study would appear to be encouraging, the content of these advertisements has been identified as an area of concern. George *et al.* [5] found that US sunscreen advertisements featured models with darker tans, more skin exposed and less hat use than non-advertisement models. They concluded that the fashion industry, especially sunscreen manufacturers, promotes excessive sun exposure. Content analysis of sun-care advertising in top-selling magazines for men, women, teens and other audience groups in the United States from 1997 to 2002 revealed that such products were primarily advertised in women's magazines, and the majority of products advertised was for cosmetics or moisturizers containing Sun Protection Factor (SPF) [6]. None of the advertisements contained all of the recommendations for safe use of sunscreen. In US newspaper coverage of skin cancer prevention and detection from 1979 to 2003, among 921 skin cancer articles found, prevention and detection each received less attention than treatment, leading the authors to conclude that news media pay little attention to skin cancer, and stories tend not to contain important educational information [7].

As certain population segments (including children and adolescents [8, 9], those with fairer skin types [10] and those playing water sports [11, 12]) are especially vulnerable to skin cancer, it is relevant to examine media presentation of sun protection behaviour and tanning among these groups. In US fashion magazines from 1983 to 1993, adult models had darker tans and greater skin exposure than adolescents and children, suggesting more pro-sun protection magazine portrayal of younger persons [5]. Content analysis of 1791 models from four

Australian teen magazines for a 12-month period (August 1999 to July 2000) found that a light tan was the most common tan level portrayed by Caucasian models [13]. Among outdoor models, 46% wore sun-safe upper body clothing and 60% wore sun-safe lower body clothing, but only 6% wore a hat and 13% were in shade.

Health-relevant content in women's magazines may affect women's health concerns and actions [14]. This study aims to examine whether the portrayal of tanning and clothing fashion for spring and summer in popular Australian women's magazines over the past two decades have been consonant or dissonant with skin cancer prevention objectives. Trends in clothing cover and tanning are examined as a function of magazine year, model characteristics (age and colouring) and settings.

A number of hypotheses were tested. If popular magazines have shifted to more pro-sun protection modelling of tanning and fashion over the past two decades, we would expect that the proportion of models portrayed with moderate to dark tans will have declined over the years. In addition, we would expect that among models depicted outdoors, the proportion portrayed as wearing hats and protective clothing and being under shade would have increased over the years. If magazines portray a pro-sun protection message for people at greater risk of skin damage, we would expect that young models will not differ from older models in their tan levels and that among those depicted outdoors, young models will be at least as well protected as older models. Furthermore, we would expect that models with phenotypes more vulnerable to sun damage (i.e. portrayed with light hair or eye colour) will be portrayed as having lighter tans than those with phenotypes less vulnerable to sun damage and as wearing more clothing cover when depicted outdoors.

Methods

Magazine sample

Six of the highest readership magazines among 14- to 29-year-old women from 1987 to 2005 (Cleo,

Cosmopolitan, Girlfriend, Dolly, Woman's Day and Australian Women's Weekly) [15], using issues from the spring and summer months (October–December and January and February of the following year), were accessed from the State Libraries of the Australian states of Victoria (77%) and New South Wales (23%). Ninety issues of each magazine were assessed, with the exception of Cleo (88 issues), making a total of 538 magazines. For each magazine issue, model images from the cover page and every tenth page thereafter were assessed. Images eligible for assessment were those that portrayed Caucasian female models who occupied at least half the page. A total of 4949 images were assessed. The sampling procedure was justified on the basis of pilot coding model's tan levels for a sample of ten magazines sampling every page versus the cover and every tenth page. A paired samples *t*-test revealed no significant difference in mean tan levels for the different sampling frames ($P = 0.163$), indicating the sampling protocol yielded a valid approximation of the magazines' overall tan-related content.

Materials and procedure

For each eligible image, a pre-formatted coding sheet was used to record image and model characteristics and outcomes related to sun protection. Characteristics relevant to the research hypotheses included the image setting (beach/pool, other outdoors or indoors) and the hair colour, eye colour and approximate age in years (14–24, 25–39 or 40+) of the model. The youngest age category was quite broad, as it was often difficult to determine whether models were teenagers or young adults. For descriptive purposes, whether the image was on the cover, the kind of image the model was in and model characteristics including presence of facial freckling, body parts visible and social context were also recorded (see Table I). Categorical outcomes related to sun protection included depicted level of tan, hat wearing, shade use and amount of clothing cover on the chest, arms, midriff and legs (see Table II). Tan level was coded relative to four reference photographs of a female model with graded tans corresponding to the codes 2 (no

Table I. Frequency distributions of image and model characteristics

	Values	<i>n</i>	%
Image characteristics			
Cover page	Yes	494	9.98
	No	4455	90.02
Setting	Beach/pool	550	11.12
	Other outdoors	975	19.71
	Indoors	3422	69.17
Image type	Feature in article	1178	23.81
	Advertisement	2156	43.57
	Illustration	968	19.56
	General fashion	600	12.13
	Celebrity fashion	46	0.93
Model characteristics			
Hair colour	Black/brown	2382	48.42
	Blonde/red	2537	51.58
Eye colour	Brown	1232	34.11
	Blue/green	2380	65.89
Facial freckling	None	4727	97.28
	Some	132	2.72
Approximate age (years)	14–24	3377	68.24
	25–39	1232	24.89
	40+	340	6.87
Body part visible	Head and neck/shoulders	1707	34.49
	Head and torso	485	9.80
	All body	2757	55.71
Social context	Alone	3514	71.02
	With female	199	4.02
	With male	492	9.94
	Social group	743	15.02

For some of these variables, the sum of categories does not equal 4949 due to missing data.

tan), 4 (light tan), 6 (moderate tan) and 8 (dark tan). Responses at each extreme and between photographs were allowed, giving a 9-point tan-level scale. This method of coding tan level has been successfully used in previous research [4, 16, 17].

Two individuals completed coding following a written protocol that contained examples of previously coded images. The first coder assessed 87% of the magazines; the second coder assessed 13% of the magazines. At the start of the project, they worked alongside one another coding a sample of the same images to resolve any inconsistencies in the classification protocol. Inter-rater reliability was assessed in a pilot study where 86 images were

Table II. Frequency distribution of tan levels and clothing cover among all models, and shade use among models depicted outdoors, and all outcomes as a function of setting

Outcome	Values (full)	<i>n</i> (%)	Values (reduced)	All images <i>n</i> (%)	Beach/pool <i>n</i> (%)	Other outdoors <i>n</i> (%)	Indoors <i>n</i> (%)
Tan level	1	71 (1.43)	No-light tan (1–5)	4406 (89.03)	380 (69.09)	881 (90.36)	3143 (91.85)
	2 (No tan)	632 (12.77)	Medium-dark tan (6–9)	543 (10.97)	170 (30.91)	94 (9.64)	279 (8.15)
	3	873 (17.64)					
	4 (Light tan)	1850 (37.38)					
	5	980 (19.80)					
	6 (Moderate tan)	464 (9.38)					
	7	71 (1.43)					
	8 (Dark tan)	7 (0.14)					
	9	1 (0.02)					
Leg cover	None	659 (29.20)	None-upper leg	1533 (67.92)	371 (85.68)	324 (58.17)	838 (66.14)
	Mid thigh	533 (23.62)	Upper and lower leg	724 (32.08)	62 (14.32)	233 (41.83)	429 (33.86)
	Knee cover	341 (15.11)					
	3/4 cover	125 (5.54)					
Hat use ^a	Ankle length	599 (26.54)					
	No hat	4647 (93.99)	No hat	4647 (93.99)	478 (86.91)	878 (90.24)	3289 (96.20)
	Peaked cap	51 (1.03)	Any hat	297 (6.01)	72 (13.09)	95 (9.76)	130 (3.80)
	Narrow brim hat	95 (1.92)					
Chest cover ^b	Broad brim hat	151 (3.05)					
	At least some exposed	3647 (73.77)	(No change)		487 (88.71)	645 (66.29)	2513 (73.48)
Arm cover	Covered	1297 (26.23)			62 (11.29)	328 (33.71)	907 (26.52)
	Sleeveless	2606 (58.73)	<3/4 sleeve	3339 (75.25)	489 (89.89)	594 (65.42)	2254 (75.56)
	1/4 length	378 (8.52)	≥3/4 sleeve	1098 (24.75)	55 (10.11)	314 (34.58)	729 (24.44)
	Elbow length	355 (8.00)					
	3/4 length	238 (5.36)					
Midriff cover	Wrist length	860 (19.38)					
	Fully exposed	493 (15.60)	Mostly or fully exposed	618 (19.56)	175 (36.69)	98 (12.48)	345 (18.18)
	Mostly exposed	125 (3.96)	Mostly or fully covered	2542 (80.44)	302 (63.31)	687 (87.52)	1553 (81.82)
	Mostly covered	216 (6.84)					
Shade use	Fully covered	2326 (73.61)					
	No shade	1275 (87.45)	(No change)		520 (96.47)	755 (82.15)	Not applicable
	Model in shade	183 (12.55)			19 (3.53)	164 (17.85)	Not applicable

For some of these variables, the sum of categories does not equal 4949 due to missing data or because some characteristics were not applicable for particular images (for instance, shade use could only be recorded for those images in an outdoor setting).

^a'Broad brim hat' refers to hats providing shade for the face and neck.

^bChest cover was coded as 'covered' if the clothes cover on the model came up to the bottom of the neck or higher.

double coded. Coder inter-rater reliability was good to excellent for tan level (intraclass correlation (ICC) = 0.8) and the clothing cover, shade, social setting and context variables (Cohen's Kappa values ranged between 0.7 and 1.0) [18], but weaker for model's physical characteristics (Cohen's

Kappa values ranged between 0.5 and 0.7). Simplifying (collapsing) some of the response categories used in the pilot study for model's hair, eye colour and freckling improved inter-rater agreement (Cohen's Kappa values ≥0.7), so this refinement was used in the protocol for the main study.

Data analysis

Frequency distributions were used for description of all variables recorded. Cross-tabulations were used to describe the distribution of modelling outcomes relevant to sun protection as a function of setting (indoors, beach/pool and other outdoors). For all multivariate analyses, those outcomes that consisted of more than two categories were dichotomized for ease of interpretation and to achieve adequate cell sizes (refer to Table II for collapsed categories). To test the first set of hypotheses, the relationship between each sun protection modelling outcome and year (i.e. each spring/summer period of coded magazine images) was assessed graphically and with logistic regression using robust standard errors to adjust for clustering on magazine. To test the second set of hypotheses, the relationships between each sun protection modelling outcome and approximate model age, hair colour and eye colour were assessed separately using logistic regression with robust standard errors to adjust for clustering on magazine. The logistic regression analyses of tan levels included all models ($N = 4949$). The logistic regression analyses of the portrayal of hats, clothing cover and shade focused only on models depicted in outdoor settings ($n = 1525$).

Results

Overall portrayal of sun-related behaviour

Table I shows that the majority of images was set indoors with only 31% ($n = 1525$) in outdoor settings. The images featured in a variety of content layouts, though advertisements were the most common image type. Hair colour varied; however, models tended to be depicted as having blue/green eyes, no facial freckling, as being teenagers or young adults, and alone.

Table II shows that the most common images of female Caucasian magazine models depicted them with no tan or light tans; a minority had moderate to dark tans. Most models were depicted as wearing clothing covering their midriff and upper legs, with their arms mostly exposed, with no hat on and in unshaded outdoor locations. Table II also shows that

for images set at a beach or pool, a greater proportion of models were portrayed as having a moderate to dark tan, wearing less clothing cover (with the exception of hat use) and not being in the shade compared with models depicted in other settings.

Assessment of outcomes over the years

Figure 1 displays percentages of images with the dichotomized sun protection modelling outcomes depicted over the years (for a given spring/summer season), with the fitted values from logistic regression. Table III displays the results from logistic regression.

The results partially supported the hypothesis that the proportion of models portrayed with moderate to dark tans would have declined over the years. A strong positive quadratic relationship indicated that between 1987 and 1999, the proportion of models portrayed with moderate to dark tans (around 20%) declined; however, this trend was averted after that period, with that proportion reaching similar levels in 2006 to the late 1980s.

The hypothesis that the proportion of outdoor models portrayed wearing hats would have increased over the years was not supported. Among models depicted outdoors, a strong negative linear relationship revealed that hat wearing declined from ~20% to virtual absence in the late 1990s and beyond.

There was little support for the hypothesis that the proportion of models portrayed wearing protective clothing would have increased over the years. Among models depicted outdoors, there was no evidence of change in the proportion of models wearing clothing covering their chest, arms or midriff, respectively. However, there was evidence that the proportion of models with their legs fully covered increased slightly.

A slight linear trend provided very weak support for the hypothesis that the proportion of models portrayed as being under shade in outdoor settings would have increased over the years.

Assessment of outcomes against model's age and phenotype

Table IV displays tan levels, clothing worn and shade depiction as a function of the magazine

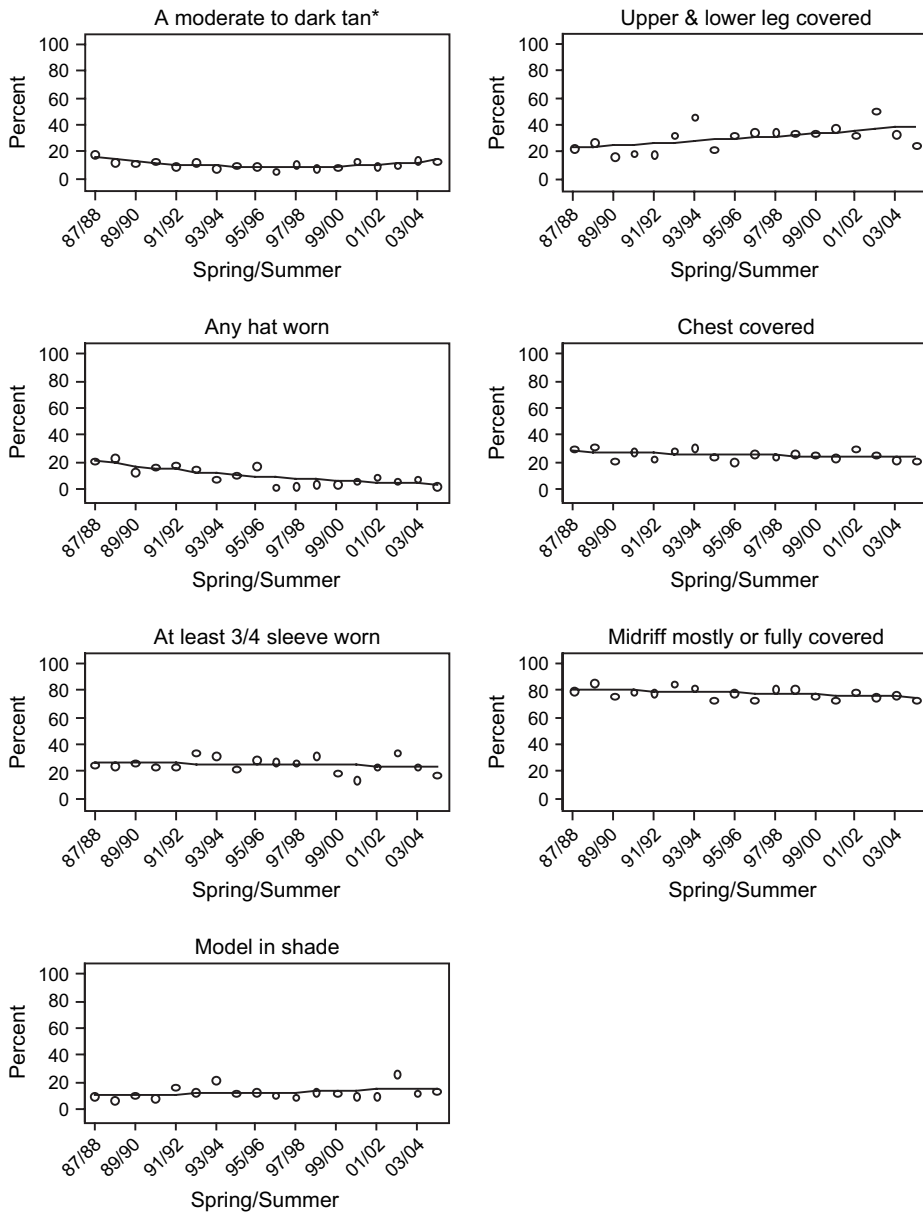


Fig. 1. Proportion of images depicting sun protection modelling outcomes over time with fitted values from logistic regression. *Analysis of tan levels included all models ($N = 4949$). Analyses of the portrayal of hats, clothing cover and shade focused only on models depicted in outdoor settings ($n = 1525$).

model's age group, hair colour and eye colour, respectively.

The data did not support the hypothesis that young models would be at least as well protected

as older models. Overall, younger models were more likely to be portrayed with a moderate to dark tan and more of their body exposed than older models (with the exception of hat wearing) and were

Table III. Logistic regression relating sun protection modeling outcomes and year (standard errors adjusted for clustering on magazine)

Outcome	Spring/summer term	OR	95% CI	P-value
A moderate to dark tan	Linear	0.838	0.743–0.945	0.004
	Squared	1.009	1.003–1.015	0.003
Upper and lower leg covered	Linear	1.046	1.027–1.067	<0.001
Any hat worn	Linear	0.892	0.865–0.921	<0.001
Chest covered	Linear	0.986	0.969–1.003	0.107
At least three-fourth sleeve worn	Linear	0.990	0.970–1.011	0.354
Midriff mostly or fully covered	Linear	0.980	0.951–1.010	0.195
Model in shade	Linear	1.027	0.998–1.056	0.072

The reference categories of the odds ratios for each outcome are provided in Table II.

less likely to be in the shade than 40+ year-old models. Furthermore, the magnitude of the effect of age was quite large for most of the outcomes. For instance, the odds of upper and lower leg cover for the 25- to 39-year-old group were over three times that of the 14- to 24-year-old group.

The hypothesis that models with phenotypes more vulnerable to sun damage (i.e. portrayed with light hair or eye colour) would be portrayed as having lighter tans than those with phenotypes less vulnerable to sun damage was supported. There was strong evidence that models with blonde/red hair were less likely to be depicted with a moderate to dark tan and tended to have more cover on their legs, chest and midriff than models with black/brown hair. Similarly, models with blue/green eyes were less likely to be portrayed with a moderate to dark tan than brown-eyed models; however, there was no evidence for difference in terms of clothing or shade use.

Discussion

Trends in clothes and tanning in magazines

In general, spring and summer issues of popular women's magazines present the majority of Caucasian women without hats and with most of the skin on their arms exposed irrespective of whether they are portrayed indoors or outdoors. The trend for magazines to convey the notion that hat wearing is uncommon has become even more marked in recent years. Among women depicted outdoors, a minority is shown to be in a shaded setting. This

pattern of fashion imagery runs contrary to the sun protection message. Magazine portrayal of other aspects of clothing cover was more pro-sun protection. Women's midriffs were generally covered, and about one-third of models were portrayed with their upper and lower leg covered.

Most Caucasian female models were portrayed as having light tans, suggesting the magazines were not promoting darker suntans as normative. However, the trend towards more Australian magazine models being depicted with light tans that Chapman *et al.* [4] observed between 1982 and 1991 and that this study observed during the 1990s was not maintained over time. By 2006, the proportion of models with moderate to dark tans had increased again to similar levels to those found in the late 1980s. The magnitude of change over the years has been relatively small. However, with sociocultural phenomena such as fashion or tanning trends, it seems plausible that the rate of change over time would not be rapid. Because magazine images are constructed and under editorial control, the darker tans depicted may be cosmetic, edited in digitally or actual tans of models acquired through excessive exposure to solar or solarium UV radiation. Whatever their basis, the increased portrayal of moderate to dark tans as an attribute among magazine models is of concern as it may convey to readers that tans have become more common and fashionable than some years ago.

Pools and beaches are high-risk settings for excessive sun exposure, warranting use of protective measures such as hats and shade at least even if

Table IV. Results of logistic regression relating outcome variables and model characteristics (adjusted for clustering on magazine)

Outcome	Covariate		Odds ratio	95% Confidence interval	P-value
A medium to dark tan	Age (years)	14–24 (ref)			
		25–39	0.44	0.35–0.55	<0.001
		40+	0.39	0.18–0.85	0.018
	Hair colour	Black/brown (ref)			
		Blonde/red	0.62	0.54–0.71	<0.001
	Eye colour	Brown (ref)			
Blue/green		0.58	0.48–0.68	<0.001	
Upper and lower leg covered	Age (years)	14–24 (ref)			
		25–39	3.36	2.19–5.14	<0.001
		40+	10.08	5.25–19.38	<0.001
	Hair colour	Black/brown (ref)			
		Blonde/red	1.47	1.17–1.84	0.001
	Eye colour	Brown (ref)			
Blue/green		1.04	0.78–1.39	0.767	
Any hat worn	Age (years)	14–24 (ref)			
		25–39	0.77	0.60–0.99	0.039
		40+	0.81	0.46–1.43	0.474
	Hair colour	Black/brown (ref)			
		Blonde/red	0.80	0.56–1.15	0.232
	Eye colour	Brown (ref)			
Blue/green		0.91	0.57–1.44	0.677	
Chest covered	Age (years)	14–24 (ref)			
		25–39	1.98	1.56–2.50	<0.001
		40+	4.09	2.54–6.58	<0.001
	Hair colour	Black/brown (ref)			
		Blonde/red	1.45	1.23–1.71	<0.001
	Eye colour	Brown (ref)			
Blue/green		1.17	0.85–1.60	0.339	
At least 3/4 length sleeve worn	Age (years)	14–24 (ref)			
		25–39	2.89	1.98–4.23	<0.001
		40+	5.74	4.23–7.79	<0.001
	Hair colour	Black/brown (ref)			
		Blonde/red	1.25	0.92–1.71	0.152
	Eye colour	Brown (ref)			
Blue/green		1.12	0.78–1.60	0.546	
Midriff mostly or fully covered	Age (years)	14–24 (ref)			
		25–39	3.22	2.01–5.13	<0.001
		40+	30.37	10.69–86.23	<0.001
	Hair colour	Black/brown (ref)			
		Blonde/red	1.41	1.16–1.72	0.001
	Eye colour	Brown (ref)			
Blue/green		0.85	0.57–1.26	0.415	
Model in shade	Age (years)	14–24 (ref)			
		25–39	1.10	0.76–1.59	0.617
		40+	2.03	1.48–2.78	<0.001
	Hair colour	Black/brown (ref)			
		Blonde/red	0.80	0.51–1.24	0.314
	Eye colour	Brown (ref)			
Blue/green		0.93	0.50–1.75	0.826	

The logistic regression analysis of tan levels included all models ($N = 4949$). The logistic regression analyses of the portrayal of hats, clothing cover and shade focused only on models depicted in outdoor settings ($n = 1525$).

wearing only swimwear. Contrary to this need, magazines present fewer women at pools/beaches as using shade or wearing protective clothing than women in other outdoor settings. While the minimal portrayal of shade use by models at pools/beaches may be related to photography lighting requirements, these same issues would have been faced in other outdoor settings where shade use was more prevalent. Hat use was slightly more common among models in these settings, but still a minority behaviour. Further, women in these settings were around three times as likely to be portrayed with a moderate to dark tan than women in other settings. It could be argued that a darker tan is a realistic consequence of spending time at outdoor swimming venues. However, given the constructed nature of magazine imagery, this is a moot point. Pairing tans with magazine models at pools and beaches might also serve to drive a fashion norm that tans are more desirable or usual in such contexts.

McDermott *et al.* [13] argued that popular Australian teen media (magazines, TV programs and movies) commonly portray protective clothing. However, these authors used a somewhat generous definition of 'sun-safe' clothing that included short- and long-sleeved shirts for the upper body and clothes covering as little as half the leg for the lower body. In the present study, we classified sun-protective clothing for the upper body as that with sleeves covering at least three-quarters of the arm and for the lower body that covering both the upper and lower leg. Our data indicate that young women were portrayed as having more of their skin exposed, having darker tans and using shade less when outdoors than older women. These findings are of concern as young people are an important target group for skin cancer prevention messages and it appears that magazines promote fashion norms for tans and clothing that directly contradict this need. It may be that fashion editors consider brief clothing as a youthful trait. It may be more socially acceptable for younger women to wear revealing summer clothing than older women. Also, the fashions available to women in clothing retail outlets for their age groups and more concern with

appearance from aging and sun damaged skin of older women may cultivate this difference.

Young magazine readers could be especially susceptible to the influence of such imagery. For some young people, the immediate perceived benefits of a tan or wearing brief clothing may outweigh perceptions of the risk of skin cancer later in life. Among young adults, self-presentational motives have been found to be a stronger predictor of UV radiation exposure than knowledge and beliefs about skin cancer [19]. Even in the long term, appearance-based concerns linked to sun exposure (such as aging of the skin) may be of more concern to those who deliberately tan than risk of skin cancer [20].

The trends for model's colouring were more encouraging since models with phenotypes more vulnerable to sun damage were portrayed as having lighter tans and slightly more clothing cover. Even though the eye, hair and tan colours depicted in magazines may not represent the true colouring of the women represented (e.g. hair may be dyed, coloured contact lenses may be worn, photos may be edited), it is encouraging that magazines were not promoting the notion that women with fair eye and hair colour can or should achieve a moderate to dark tan.

The nature of magazines

The SunSmart skin cancer prevention program has worked since 1988 to increase public awareness of the risks of excessive sun exposure and the need for sun protection in Victoria, Australia. Population surveys indicate that between 1988 and 2000, improvements in sun-related attitudes and behaviour have occurred [12, 21]. However, this study suggests that the SunSmart campaign has not been accompanied by trends in local mainstream magazine media portrayal of sun-protective behaviour that clearly reinforces the skin cancer prevention message. Should these fashion trends persist or become even less supportive of sun protection, further improvements in sun-protective behaviours may be more difficult to achieve.

While the focus of this study is on the agreement between skin cancer prevention needs and trends

for clothing cover and tanning in magazines, this is unlikely to be a focus of those responsible for creating such imagery in popular women's magazines. The style of clothes and levels of tans presented in popular magazines are likely to derive from a range of motives of magazine editors, photographers and stylists such as a desire to capture reader's attention, engage their target audience and to reflect and convey current fashion trends. Sun protection issues may not even come into consideration. Designers and stylists promoting brief clothing or tans are unlikely to be deliberately trying to undermine skin cancer prevention efforts; there is more likely a lack of priority given to this issue. However, the tanning industry (solaria and fake tan) has a vested interest in promoting tans, so for these groups promoting their product means deliberately promoting a pro-tan message. With around 44% of models in this study appearing in advertisements, it is possible that some of these were for tanning products. Extending content analyses to enable monitoring of the type of products being promoted in magazine advertisements would provide valuable information on the marketing tactics employed by the tanning industry. Consumer's tan preferences and clothes choices in summer are also likely to be influenced by a range of factors such as appearance concerns (signifying group membership, flattering one's physical attributes, modesty), desire for comfort (in the case of clothes: thermoregulation, ease of movement) and possibly health concerns (skin cancer prevention).

The challenge for skin cancer prevention programs is to promote awareness of sun protection as a key consideration when making clothing and tanning choices in summer and to convey the notion that being pro-sun protection does not preclude being fashionable. Possible avenues for influencing fashion and related media would be for skin cancer prevention programs to carry out awareness raising activities in these industries, and even garner support by sponsoring design competitions for sun-protective hats and clothing. Promoting greater awareness and concern about skin cancer prevention among magazine editors may help encourage more pro-sun protection fashion portrayal, along with increased text-based coverage of skin cancer

and prevention. The SunSmart program currently makes efforts to encourage feature article coverage of skin cancer prevention in magazines; however, influencing sun-related fashion content in magazines has not been a focus [SunSmart, personal communication]. Another strategy would be to work to disseminate counter messages such as those normalizing or modelling sun-protective behaviour or debunking myths concerning tans and sun exposing clothes perpetuated in fashion magazines. Since 1996/97, television advertisements aired by SunSmart have focused on graphically illustrating the gruesome consequences of excessive sun exposure without explicitly modelling sun protection behaviour [3]. In contrast, during the early SunSmart years (1989–95), some of SunSmart's television commercials and print advertisements focused on modelling sun-protective behaviour as normative and fashionable. It may be timely to investigate consumer and fashion industry perceptions of the need for and acceptability of sun-protective fashions to help inform future mass communication efforts.

Methodological issues

We were only able to code visible forms of sun-related behaviour. It is possible that those photographed wearing brief clothes outdoors could have been using sunscreen to protect their skin. Even if this were so, sunscreen is not recommended as a sole method of sun protection but should be one part of a comprehensive sun avoidance strategy that includes moving into shade during peak UV radiation periods and the use of protective clothing [22]. Therefore, recurrent promotion of brief clothing and lack of hat wearing in unshaded outdoor settings in women's magazines may be viewed as counterproductive to skin cancer prevention even if sunscreen is used.

This study examined fashion trends relevant to sun protection rather than total coverage of content relevant to skin cancer prevention. It is possible that some of the magazines covered text-based content relevant to skin cancer prevention. However, it was beyond the scope of the present study to document this.

Conclusion

Implicit messages about sun protection conveyed by models in popular women's magazines contradict public health messages concerning sun protection. This content analysis indicates that recent fashion trends for hat use and tanning and for overall sun-related content targeted at young women are moving in a direction at odds with the skin cancer prevention message. Given their enormous readership, women's magazines are an ideal medium for reaching millions of women with health-promoting messages. If public health advocates wish to harness the energy of popular mass media to promote health messages, they must react quickly to counterproductive trends. Skin cancer prevention programs should be more reactive and proactive in attempting to influence the mainstream media agenda in a direction supportive of skin cancer prevention. The potential reach of such media is far greater than cancer prevention programs can achieve with their relatively small budgets. Developing coordinated, consistent media advocacy strategies aimed at influencing both the explicit skin cancer prevention messages and the more implicit modelling of sun-protective behaviour through fashion trends could result in reinforcement of a sun protection message rather than the contradiction that is inherent in current magazine portrayal of women's clothing and tanning trends.

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Conflict of interest statement

None declared.

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