The Ulster Medical Journal, Volume 73, No. 2, pp. 96-104, November 2004.

Knowledge, attitudes and behaviour in the sun:
the barriers to behavioural change in Northern Ireland

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Accepted 28 April 2004

SUMMARY

To inform future health promotion programmes, we studied the knowledge, attitudes and behaviour of the Northern Ireland population to sun care. An interviewer-administered questionnaire was applied to one adult per household from a random sample of 1242 addresses. Lower levels of knowledge were found among respondents who were male, aged under 25 years or over 65 years, in a manual occupation or living in the west where health promotion activity on this topic was less active than in the east. Younger adults, females and professional groups were more likely to indicate that a suntan was important, healthy or attractive. Use of high factor sunscreen was inversely proportional to perceived importance of a suntan. Sunburn was more common in younger adults but more men reported multiple episodes of burning. Regular skin checks were uncommon and self-assessment of skin type was unrealistic indicating that sun care advice based on self assessment should be avoided in this population. Future campaigns should target appropriate messages at specific population subgroups. The study highlights the importance of collecting baseline information before implementing health promotion programmes and suggests that repeat monitoring is essential to ensure that key messages remain relevant. This study also indicates that Care in the Sun campaigns here impacted on general awareness in the population even with limited resources. There is, therefore, potential for greater impact with high funding levels.

INTRODUCTION

Similarly to many developed countries,[1] Northern Ireland's population of approximately 1.7 million has experienced a recent increase in the incidence of skin cancer. Data from the Northern Ireland Cancer Registry indicate that the number of cases of malignant melanoma has risen from an average of 48 cases per year (1974-1978) to 190 cases per year (1998-2001) and that approximately one quarter of all newly diagnosed cancers are non-melanoma skin cancers.[2] The aetiology of malignant melanoma remains under debate. Exposure to ultraviolet radiation causing burning and a genetic predisposition have been cited as probable risk factors.[3,4] Northern Ireland has a mainly homogeneous, fair-skinned population with less than 1% identified as belonging to ethnic minority groups.[5] As the vast majority of people have skin Type I or II,[6] they are at greater risk of burning if they do not take adequate protective measures in the sun.

Increased exposure to ultraviolet radiation as a result of changing lifestyles may help to explain the rising incidence of malignant melanoma. The Northern Ireland Tourist Board indicates an

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increase in the number of residents travelling abroad, with the number taking holidays of more than 4 days' duration outside Northern Ireland increasing by 20% between 1989 and 1999.[7]

A "Care in the Sun" campaign began in Northern Ireland in 1990 as part of the "Europe Against Cancer" initiative. This campaign aimed to raise public awareness of the dangers of the sun, sunburn in childhood, and the early detection of malignant melanoma. Initiatives were co-ordinated locally within each of the four Health and Social Services Board areas and varied according to the level of interest in sun care issues among staff. This effort was supplemented by a regional 'Strategy for the prevention, diagnosis and treatment of malignant melanoma and other skin cancers in Northern Ireland" which was launched in 1997 and which advocates a multi-agency approach to reducing morbidity and mortality from skin cancer.[8]

This survey aims to augment the limited information available on sun care issues within Northern Ireland by examining current knowledge, attitudes and behaviour, and to identify if there are subgroups of the population who require particular attention in future health promotion campaigns.

METHODS

Sixteen questions relating to sun care knowledge, attitudes and behaviour were included as a module of a household Omnibus Survey in May 2000. The questions were adopted from those used previously in population surveys on sun care issues.[9,10] The survey, used by public bodies, is carried out four or five times each year to collect data on a range of issues. This was the first time that a sun care module had been included.

A random sample of 2050 addresses was drawn from the Valuation and Lands Registry list of

TABLE I

Characteristics of the respondents

Factor	*Sample size*	*Survey Population(%)*	*N Ireland population(%)*
***Gender**			
Male	522	47.1	48.2
Female	587	52.9	51.8
***Age group**			
16-24	191	17.2	16.7
25-34	162	14.6	20.2
35-49	319	28.8	26.1
50-64	244	22.0	19.7
65+	194	17.5	17.2
† Social Class			
Professional (I)	186	16.7	2.8
Non-manual (II+IIInm)	313	28.2	36.1
Skilled manual (IIIm+IV)	412	37.1	30.5
Unskilled manual (V)	56	5.0	6.0
Unclassified	144	12.9	24.7
***Geographical area of residence**			
Belfast	168	15.1	16.8
East of Province	539	48.6	45.4
West of Province	402	36.3	37.8

Sources of N Ireland data:

* General Register Office, Northern Ireland Statistics and Research Agency, 1999 mid-year population estimates

† Registrar General Northern Ireland, The Northern Ireland Census 1991, Economic Activity Report

TABLE II

Respondents' knowledge of sun care issues

	Agreement (%)						
	Gender		Age (years)				
	Male	*Female*	*16-24*	*25-34*	*35-49*	*50-64*	*65+*
Areas previously included in health promotion programmes							
In the sun people need to drink fluids to avoid dehydration	99	99	98	100	99	99	98
It is not OK to fall asleep in the sun (gender $p<0.001$)	98	99	98	98	99	98	98
You can help protect yourself by wearing a hat/T-shirt	99	98	98	98	99	98	98
Sitting under a tree/umbrella can provide some protection (age $p<0.001$)	98	96	91	99	97	99	99
Areas not specifically included in previous health promotion programmes							
You can burn on a cloudy day (gender $p<0.05$, age $p<0.001$)	83	88	84	91	90	87	75
You are not protected from sunburn while in the sea (gender $p<0.001$, age $p<0.001$)	90	96	94	94	95	95	86

addresses. An interviewer called at each address and, in the first instance, established the number of households resident at that address. If more than one household was resident, the interviewer selected one household to be included using a selection table. The interviewer listed the members of the household who were eligible for inclusion (i.e. all persons aged 16 or over living at the address). One eligible adult from each household was 'selected' at random by the computer to complete the interview.

Contingency tables were constructed according to age, gender, social class and area of residence. These were weighted to adjust for the fact that selection of individual participants occurred at household level rather than from the general adult population. Chi-square analysis was carried out using SPSS statistical software.

RESULTS

A sample of 1853 eligible addresses was obtained and an interview achieved in 67% of these. Table I describes the characteristics of the respondents.

Knowledge

Six questions were used to establish the level of knowledge about sun care issues. Questions relating to key messages previously included in local health promotion campaigns were answered correctly by the majority of respondents (Table II) but knowledge on other issues was noted to be poorer. Only 2% indicated that it was OK to fall asleep in the sun, 7% believed that the sea provided protection from sunburn and 14% recorded wrongly that it was not possible to burn on a cloudy day.

Statistically significant differences in knowledge were found between different subgroups. Males and respondents aged 16-25 years or 65+ years had a poorer level of knowledge in particular areas. Respondents employed in skilled manual occupations had poorer knowledge about the likelihood of burning on a cloudy day, the lack of protection provided by the sea and the protection provided by a hat or T-shirt, than the group as a whole. Knowledge about burning on a cloudy day was higher amongst respondents living in the more urban eastern areas.

When asked to categorise their skin type into one of five groups, 34% replied they rarely or never burned with 43% replying they burn always but may tan later. Statistically significant differences were noted for gender with only 38% of men

TABLE III

Respondents' attitude to a suntan

	Agreement(%)						
	Gender		*Age (years)*				
	Male	*Female*	*16-24*	*25-34*	*35-49*	*50-64*	*65+*
Personal importance of a suntan (gender p<0.05, age p<0.001)							
very important	4	8	10	7	7	4	5
fairly important	13	15	24	15	14	12	9
I agree or strongly agree that:							
. . . having a suntan makes me feel healthier (gender p<0.05)	33	40	37	41	39	34	32
. . . having a suntan makes me look more attractive (gender p<0.01, age p<0.001)	42	51	53	48	50	45	34
. . . I believe I can reduce the risk of getting cancer (gender p<0.05, age p<0.001)	68	74	57	71	72	79	74
. . . too much sun might cause skin cancer to develop	97	97	99	96	97	98	94

reporting 'burn always' compared to 50% of women (p<0.01). Younger (16-34 years) people were less likely to report burning than older people: 38% vs 45% (p<0.001).

Attitude

Twenty percent of respondents indicated that it was "very" or "fairly" important to have a suntan. Twenty-three percent of female respondents rated a suntan as important compared to 17% of males (p<0.05), while 34% of 16-25 year-olds rated a suntan as important compared to 14% of those aged 65+ years (p<0.001) (Table III). Although not statistically significant, professional occupational groups were more likely to rate a suntan as important than those in skilled manual occupations (25% vs. 18%).

Forty percent of female respondents and 33% of males indicated that a suntan made them feel healthier (p<0.05). Statistically significant differences occurred between social classes (p<0.001) where 54% of those in professional occupations and 44% of those in non-manual occupations rated a suntan as healthy, in comparison to 25% of skilled manual workers and 29% of unskilled manual workers (Table IV).

Over one half of females agreed that a suntan made them look more attractive compared to 42% of males (p<0.01). Viewing a suntan as attractive also differed significantly with age (p<0.01). and social class (p<0.001). A suntan was more likely to be seen as attractive by younger respondents (53% of 16-24-year-olds) than by those aged 65+ years (34%). This attitude was also more common in respondents in professional (58%) and non-manual occupations (52%) than in skilled manual (36%) or unskilled manual workers (39%) (p<0.001).

Although 71% of all respondents believed they could reduce their risk of cancer, only 57% of those aged 16-25 years agreed. However, 99% of this age group did agree that too much sun might cause skin cancer. A similar contradictory pattern was found in males (68% and 97% respectively). Differences in self-perceived risk were noted between geographical areas with respondents resident in the west less likely to agree that they could reduce their risk than those resident in the east of the country (66% vs 74%) (Table IV).

Behaviour

Only 9% of males and 15% of females reported that they never go out in the sun but this behaviour increased with age, from 4% of 16-24 year olds to 24% of those aged 65+ years. Eighteen percent of males recorded that they go out in the sun but never use sunscreen, compared to 7% of females.

Of those who did go out in the sun and use a method of protection, 41% used only one method of sun protection while only 2% used all five methods (Table V). Males and respondents aged 65+ years were more likely to use only one method of sun protection. Significant differences between social classes were again noted, with those in professional and non-manual occupations tending to use more methods of sun protection than those employed in manual occupations. Respondents living in the east were also more likely to use multiple methods of sun protection than those in other areas.

Only 6% of females and 4% of males recorded that they performed regular skin checks. The proportions increased with age from 3% of 16-24 year olds to 7% of respondents aged 65+ years.

Sunscreen was used by 45% when sunbathing in this country and 59% of respondents when sunbathing abroad. This was highest in the 16-24 year age group at 79%, falling to 28% in those aged 65+ years. Overall, 50% reported using sunscreen when outdoors abroad but not sunbathing. Those who were most likely to state that they never used sunscreen were male (16%) or aged 65+ years (27%). Although professional and non-manual occupational groups tended to use sunscreens on more occasions than those in manual occupations, they were more likely to use a sunscreen with a low Sun Protective Factor (SPF): 40 % reported using SPF 15 compared to 52% of non-manual workers and 49% of skilled manual workers. It was also noted that those aged 16-35 years tended to use lower factors of sunscreen than respondents in other age groups. Sunscreen was used on more occasions by respondents in the east of Northern Ireland. Respondents who viewed a suntan as "not important" tended to use a higher factor of sunscreen (54% used SPF 15 or over) than those who rated a suntan as "very important" (21%) or "fairly important" (35%).

Sunburn at least once in the past year was most likely in those aged 16-25 years (Table V). Although similar proportions of males and females reported one episode of sunburn in the past year,

TABLE 4

Respondents' knowledge of and attitude towards sun care by social class and geographical area of residence
(statistically significant results only shown)

	Agreement (%)						
	Social class				*Area of residence*		
	I	*II+ IIInm*	*IIIm+ IV*	*V*	*Belfast*	*East*	*West*
Knowledge							
You can help protect yourself by wearing a hat/T-shirt (social class p<0.05)	99	99	99	93	98	99	98
You can burn on a cloudy day (social class p<0.001, area p<0.05)	95	90	82	84	81	87	81
You are not protected from sunburn while in the sea (social class p<0.001)	96	96	91	88	90	94	94
Attitude							
I agree or strongly agree that . . .							
. . . having a suntan makes me feel healthier (social class p<0.001)	54	44	25	29	39	37	34
. . . having a suntan makes me look more attractive (social class p<0.001)	58	52	36	39	46	46	47
. . . I believe I can reduce the risk of me getting cancer (area p<0.001)	74	71	70	69	67	74	66

TABLE V

Behaviour of respondents in the sun

	Agreement (%)						
	Gender		Age				
	Male	*Female*	*16-24*	*25-34*	*35-49*	*50-64*	*65+*
Number of methods of sun protection used (gender p<0.001, age p<0.05)							
One	45	37	45	36	40	36	49
Two	27	27	30	31	22	29	24
Three	19	21	16	20	24	23	16
Four or more	9	15	9	13	14	12	11
base	*486*	*556*	*185*	*154*	*296*	*226*	*186*
Number of occasions when sunscreen is used (gender p<0.001, age p<0.001)							
Never	16	7	4	7	8	11	27
One	29	30	24	20	29	34	41
Two	26	20	31	31	23	21	11
Three	14	18	18	20	17	14	9
Four or more	15	25	23	22	23	20	13
base	*484*	*556*	*184*	*153*	*298*	*229*	*181*
Factor of sunscreen used most often (age p<0.01)							
2-5	12	9	7	18	10	10	10
6-10	28	32	39	29	30	23	31
11-14	12	11	12	14	6	16	10
15 or over	48	48	42	39	54	52	49
base	*346*	*435*	*165*	*135*	*234*	*167*	*83*
Number of times in the past year when sunburnt (redness and soreness of the skin lasting for at least 1-2 days) (gender p<0.01, age p<0.001)							
Never	77	80	59	66	79	85	97
Once	16	17	32	22	17	10	3
Twice or more	8	3	10	12	4	5	0
base	*514*	*585*	*188*	*162*	*320*	*244*	*191*

males were more likely to have had multiple episodes of burning (8% vs 3% of females). There were no significant differences in the factor of sunscreen used by those who reported sunburn in the past year and those who did not.

DISCUSSION

The use of the Omnibus Survey to administer a sun care module limited the range and number of questions which could be included in this study. However, this methodology facilitated access to a larger and more representative sample than would have been possible using a specific sun care survey. Comparison with the Northern Ireland population (Table I) shows an under-representation of 25-34 year olds and an over-representation of 35-64 year olds in the survey sample. This finding would be expected for a survey, such as this, which is administered by personal interview at home visit. There is also a marked over-representation of professional occupational groups. It is recognised that the results pertaining to the attitude and behaviour of respondents may be subject to bias as answers may have been influenced by the fact that respondents knew they were being studied. However, as respondents would tend to give a perceived 'appropriate' answer rather than a 'true' answer, the reported results are likely to be an underestimate.

As populations differ in their approach to sun exposure, the findings of this study may not be generalisable. However, the survey has highlighted a number of key issues to be considered when planning health promotion campaigns. The most notable are the differences between subgroups in their knowledge, attitudes and behaviour. Men tended to have a lower level of knowledge about sun care issues, used fewer methods of sun protection and were more likely to report burning. These findings suggest that health promotion initiatives targeted at men need to address their gaps in knowledge. In comparison, women showed better knowledge of sun care issues and reported more use of sun protection methods. However, they indicated a higher level of personal importance in a suntan, suggesting that initiatives aimed at addressing attitudinal barriers to sun care may be most effective in women.

Similar conclusions can be drawn for the other subgroups studied. Young adults and those aged over 65 years had a poorer level of knowledge than other age groups. However, while young people considered a suntan as important, the elderly population did not. Effective health promotion campaigns for young adults should, therefore, address both knowledge gaps and attitudes. While a high percentage of those aged over 65 years reported not going out in the sun (24%), those who did go out tended to use fewer methods of sun protection and were less likely to use sunscreen. The value of sunscreen in preventing actinic keratoses in the elderly has been reported in a large study in Australia, so it is important that knowledge of sun protection measures should also be promoted to this age group.[16] Analysis of social class differences indicated that those in social class I had a high level of knowledge about sun care issues but considered a suntan to be important. Those in lower social class groups indicated poorer knowledge but gave less importance to a suntan. This suggests that behavioural change may be best achieved by targeting higher social class groups with initiatives to address attitudes, while concentrating on the knowledge gaps for those in lower social class groups.

Differences in population subgroups have been demonstrated in countries such as Australia,[11] the USA[12] and Sweden[13] but they have also been reported locally in two smaller studies in Northern Ireland, which found high levels of sunburn especially in males and young people.[14,15] To date, many health promotion campaigns on sun care in Northern Ireland have been aimed at the whole population. Target groups for whom specific resources have been developed are children, outdoor workers and holidaymakers going abroad. However, this study indicates that there are major differences between adult groups in their health promotion needs regarding sun care and, hence, a more targeted approach to delivering key messages based on age, gender and social class should be considered.

Sun care advice is often based on self-assessment of skin type as an indicator of risk. Although Northern Ireland has a homogeneous population with a small ethnic minority, 24% of respondents categorised their skin as Type IV (rarely burns and tans easily) and 10% stated they had skin Type V (never burns and tans easily).[6] This is contrary to dermatological experience which would indicate that the majority of the population have skin Type I or II. These figures imply that individuals may not have the ability to accurately categorise skin type and are subsequently at risk of misinterpreting advice that is based on this assumption. Using self-assessment of skin type as a method of delivering sun care advice should, therefore, be avoided in this population.

Campaigns have aimed to encourage the use of sunscreens of a high protective factor, with an SPF of at least 15 now being recommended. The findings suggest that the personal importance given to a suntan is inversely related to the factor of sunscreen used most often; respondents who placed less importance on a suntan tended to use higher factors of sunscreen. However, the factor of sunscreen used most often did not correlate with the occurrence of sunburn in the last year. Those who used a sunscreen of SPF 15 and above reported similar occurrences of sunburn as those who used lower factors. This may be explained by the findings of a Liverpool study which reported that patients did not apply adequate thickness of sunscreen to provide protection.[17] As well as promoting the use of high factor sunscreens, initiatives should highlight that sunscreens need to be used appropriately and that other methods of sun protection such as seeking shade and avoiding the midday sun are preferable and more effective.[3]

Regular skin checks were not routinely carried out by the survey population but they have an

important role in secondary prevention as demonstrated by a public campaign to promote early detection of melanoma in the west of Scotland in June 1985.[18] This succeeded in reducing the absolute number of thick tumours and melanoma related mortality in women, but not in men. This correlates with a Belfast study where men were reported as being less likely to carry out routine skin examinations than women.[14] A large epidemiological study is currently underway in association with the Northern Ireland Cancer Registry to evaluate the success of local campaigns aimed at promoting early detection of disease. However, the findings reported here suggest that the benefits of regular skin examination require widespread promotion. Learning from the Scottish experience, particular attention should be given to the way in which this message is targeted at men.

Sun care initiatives in Northern Ireland have traditionally been organised within the four Health and Social Services Board areas to meet the needs of local populations. These campaigns have been of varying intensity and quality, have been supported by minimal resources and have largely been driven by staff with a particular interest in sun care. The study indicates that the "Care in the Sun" campaign may have impacted on the level of general awareness among the population, even within these limited resources. There is, therefore, potential for even greater impact if adequate funding were available.

Geographical differences noted in the survey should be highlighted for action. Some variations may be accounted for by differing social structures and lifestyles, however, it is noted that the "Care in the Sun" Group has been more pro-active in Belfast and the east of Northern Ireland, where a higher level of awareness of sun care issues is evident. There is an identified need to raise awareness of all sun care issues in the west of the country. A co-ordinated regional approach to promoting sun care is currently underway to help address these geographical inequities.

Sun care initiatives are in their infancy in Northern Ireland when compared to the years of experience in primary prevention programmes obtained to date in Australia. Evidence suggests that knowledge about sun care does not equate to behaviour [11, 19] but the Australian experience demonstrates that campaigns aimed at knowledge and attitude can succeed in modifying behaviour.[20, 21] A lack of knowledge and the attitude that a suntan is important, healthy and attractive are barriers to achieving behavioural change. As significant differences exist between population subgroups, the specific health promotion needs of each group must be met in order to overcome these barriers and achieve maximum gain.

This survey highlights the importance of collecting baseline information prior to implementing any health promotion programme. Although baseline data had not been obtained in this case, the previous sun care campaigns in Northern Ireland appear to have had some impact, as evidenced by the higher level of awareness on issues included in these campaigns. Obviously other outside influences, such as the media, may also have had an effect. Learning from the experience gained in countries such as Australia and Scotland, we can use the results of our survey to provide us with a way forward to reduce the incidence of skin cancer in Northern Ireland. This data will focus the implementation of the strategy, however, it is recognised that this is only a beginning and it is important that the survey be repeated in three to five years' time. Questions on the use of sunscreen should be considered if planning a repeat survey; such as the frequency of reapplication and if the use of sunscreen encourages respondents to stay in the sun for longer periods of time. Research on the travel habits of different population subgroups within Northern Ireland would also help to inform the targeting of future initiatives. Only by continuing to monitor the impact of health promotion campaigns on the knowledge, attitudes and behaviour of the population will it be possible to ensure that key messages remain appropriate and long term sustainable effects are achieved in preventing skin cancer.

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