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Abstract:

Skin cancer rates in the UK have risen steadily, doubling in the past decade resulting in significant public and personal costs. Cancer Research UK has run the national SunSmart awareness programme since 2003, but budget restrictions have prohibited the use of large scale mass media interventions. A behavioural segmentation approach based on situations and locations where sunburn has occurred may offer the foundations for specifically targeted interventions. We therefore report on a large-scale national telephone survey of the general population regarding the circumstances and sun protective behaviours where sun exposure had led to sunburn. The data indicates a range of attitudinal, behavioural and knowledge factors that should be addressed in developing future interventions. A cluster analysis shows clear behavioural differences across different population segments. Recommendations for interventions targeting each of the main segments identified are provided for each identified segment. Recommendations for future research conclude the paper.

Introduction

Skin cancer is the most common cancer in the United Kingdom, with estimates of nearly 82,000 cases of non-melanoma and 10,400 cases of melanoma registered in 2006 (Garside et al., 2010). Skin cancer rates have risen steadily in the United Kingdom, doubling in the past decade and continue to increase at some 8% per year, faster than any other cancer (NICE, 2006). More Britons die of melanoma each year than in Australia which has four times the UK rate of skin cancer diagnosis. The difference in mortality rates can be attributed to earlier detection and higher levels of effective sun protection strategies in Australia (Miranda, 2008).

Mass media campaigns, coupled with interventions targeted at specific population segments have significantly reduced sunburn rates in Australia (Sinclair & Foley, 2009). Activity in the UK has been limited due to budgetary constraints, and centres primarily on website and school-based activity. A recent study showed that prompted awareness of SunSmart increased from 6.5% in 2003 to 17.5% in 2009 (Jones, 2010). This indicates growing awareness of SunSmart, key messages are not reaching the population as quickly as mass media-supported interventions would permit. Information about sun protection and skin cancer is largely passively acquired (Eadie & MacAskill, 2007), therefore in the absence of mass media initiatives, consideration should be given to taking sun protective messages to specific segments of the population where behaviour that has resulted in sunburn in the past is occurring.

Research Methodology

A Cancer Research UK- sponsored telephone survey of 5,034 people aged 16+ years, 46% male and 54% female, was conducted during August – early September 2009.

As most skin cancers are related to sun exposure (Falk & Anderson, 2008; Murphy, 2002), questions centred on the incidence of self-reported sunburn, the situations in which the sunburn occurred and sun protective behaviours at the time.

Potential Interventions Based on Segmentation

Segmenting the population on the basis of key behaviours would enable interventions to be targeted at specific segments, drawing on the collaboration and resources of potential partners. A segmentation strategy based on four clusters is presented. A two-step cluster analysis was undertaken on responses from survey respondents who had indicated that they had been sunburnt within the current year. The filtering of the data file for the respondents that had reported burning resulted in a sample size of 1606 (31.9%), selected from the main data file of 5034 records. The clustering process was exploratory and automatically determined with a maximum 15 cluster allowed within the calculations. The clustering criterion used was Schwarz's Bayesian Criteria (BIC), BIC ratio of change and ratio of distance measures (Fraley & Raftery, 1998) using a combination of categorical and continuous variables. Cluster memberships were created, added to the file and group membership to these clusters was allocated to the individual respondents. A total of four clusters (segments) were identified during the two-step analysis. The clusters were reported at the 95% confidence level with non-significant variables being automatically omitted from the model. Within Table 1, the significant variables from the cluster analysis are detailed for the segments. Cross-tabulations with non-significant descriptor variables have been used to further analyse the segments.

Table 1: Sub-sample - Respondents who indicated that they had burnt within the current year – Segment Stereotypes					
Variable	Sig	Segment 1 *Outdoor Gamers*	Segment 2 *Aqua 'Bathers'*	Segment 3 *Out and About*	Segment 4 *Sun seekers*
Segment Size		**17.5%**	**23.6%**	**36.2%**	**22.6%**
Demographic Variables					
Gender	Sig	Male: 47% Female: 52%	Male: 47% Female: 52%	Male: 27% **Female: 72%**	Male: 32% **Female: 68%**
Geographic					
UK/ Abroad Sunburnt	Sig	Over 75% in the UK	Over 80% abroad	Over 60% in the UK	Over 80% abroad
Behavioural/ Knowledge					
Recency of Sunburn	Sig	Approximately 50% within last 4 weeks	Over 50% within last 4 weeks	Over 60% within last 4 weeks	Less than 50% within last 4 weeks
Activity participating in when sunburnt	Sig	**100% sporting activities, running, playing football etc**	**100% in and out of the water such as sea pool and rivers**	**100% walking around shopping, in the park, in the garden**	**100% sunbathing**
Factor sunscreen worn	Sig	Over 50% higher than factor 15	Over 60% higher than factor 15	Approximately 60% higher than factor 15	40% higher than factor 15
Physical					
Sunburnt on head (face, neck, ears	Sig	*Approximately 50% burnt* **face (29%),** top of head (10%), **neck (19%),** ears (less than 1%)	*Approximately 25% burnt* **face (20%),** top of head (4%), neck (4%), ears (less than 1%)	*Approximately 40% burnt* **face (29%),** top of head (7%), **neck (17%),** ears (less than 1%)	*Approximately 25% burnt* **face (18%),** top of head (3%), **neck (7%),** ears (less than 1%)
Sig = Significant variable used in cluster development					

Segment 1 – Outdoor gamers: The smallest of the four segments (17.5%) is divided between male (47%) and female (52%) members. Over 75% of this segment reported being sunburnt while within the United Kingdom and 50% of those reporting that it had occurred within the four weeks preceding the survey. All respondents obtained their sunburn by participating in sporting activities with 80% reporting that exposure was over two hours. Although a sunscreen factor-15 was used by more than 50% of the segments members, over 60% reapplied the sunscreen less than once in every two hours.

Interventions appropriate for this segment should focus on addressing self efficacy and social norms. Integration of activity with recreational facility providers should be investigated (e.g. parks and recreation centres) regarding signage and other ways of raising awareness. Sports governing bodies or associations, and sports coaches could be key role models to educate sports participants regarding effective sun protection, to

model effective sun protection behaviours and to address the social acceptability of behaviour change (Dadlani et al., 2008).

Segment 2 – Aqua-'bathers': The second largest of the four segments (23.6%) is divided between male (47%) and female (52%) members. Over 80% reported being sunburnt while abroad, and 50% of those reporting that it had occurred within the four weeks preceding the survey. Respondents obtained their sunburn by participating in water activities with 70% reporting that their exposure was over two hours. Although a sunscreen factor-15 was used by more than 60% of the segments members, approximately 40% reapplied the sunscreen less than once in every two hours. A key challenge with this segment is that the majority of sun burn occurs outside the UK. Strategies that could be considered would be to integrate activity with travel agents, airlines, hotel chains etc, placing information on websites and possibly providing practical tips and information with airline tickets and hotel reservations.

Segment 3 – Out and About: The largest of the four segments (36.2%) is dominated by female members (72%). It has the highest proportion of 55-64 (20%), 65+ (11%) when compared to the other segments, possible due to the more sedentary type of activities involved. Over 60% reported being sunburnt while within the UK. All respondents obtained their sunburn by participating in 'walking around shopping', in the park and in the garden, with 60% reporting that their duration of exposure was over two hours. Although a sunscreen factor-15 was used by more than 60%, approximately 60% of these reapplied the sunscreen less than once in every two hours. This segment has a clear educational need as regard to the strength of the UK sun (Hedges & Scriven, 2008). Strategies could include signage in retail premises

such as pharmacy windows and Tourist Information Centres and collaborative promotional activity both with retailers and commercial sunscreen manufacturers.

Segment 4 – Sun seekers: The third largest of the four segments (22.6%) is dominated by female members (68%). This segment does have the highest proportion of 16-24 yrs (20%), and the smallest 25-34 yrs (13%), when compared to the other segments. Over 80% of this segment reported being sunburnt while abroad, and less than 50% of those reporting that it had occurred within the four weeks preceding the survey.

All respondents obtained their sunburn by participating in sunbathing, with approximately 70% reporting that their exposure was over two hours. Although a sunscreen factor-15 was used by more than 40% of the segments members, less than 40% reapplied the sunscreen less than once in every two hours. To change behaviours will be a challenge as it will involve influencing social norms, a known significant influence on behaviour (Fishbein & Capella, 2006). Competition comes from messages counter to recommended sun protection strategies which are regularly shown in consumer media, including glamorising sun tans and showing celebrities with poor sun-protective behaviours (Dixon, 2007).

Recommendations for Future Research

The segmentation analysis identifies four key behaviourally-based segments and raises the possibility of intervention strategies that could usefully supplement those currently in use. The segmentation analysis also illustrates the possibility for greater partnership collaboration in order to effectively reach the members of each segment where sub-optimum sun protective behaviours actually occur.

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